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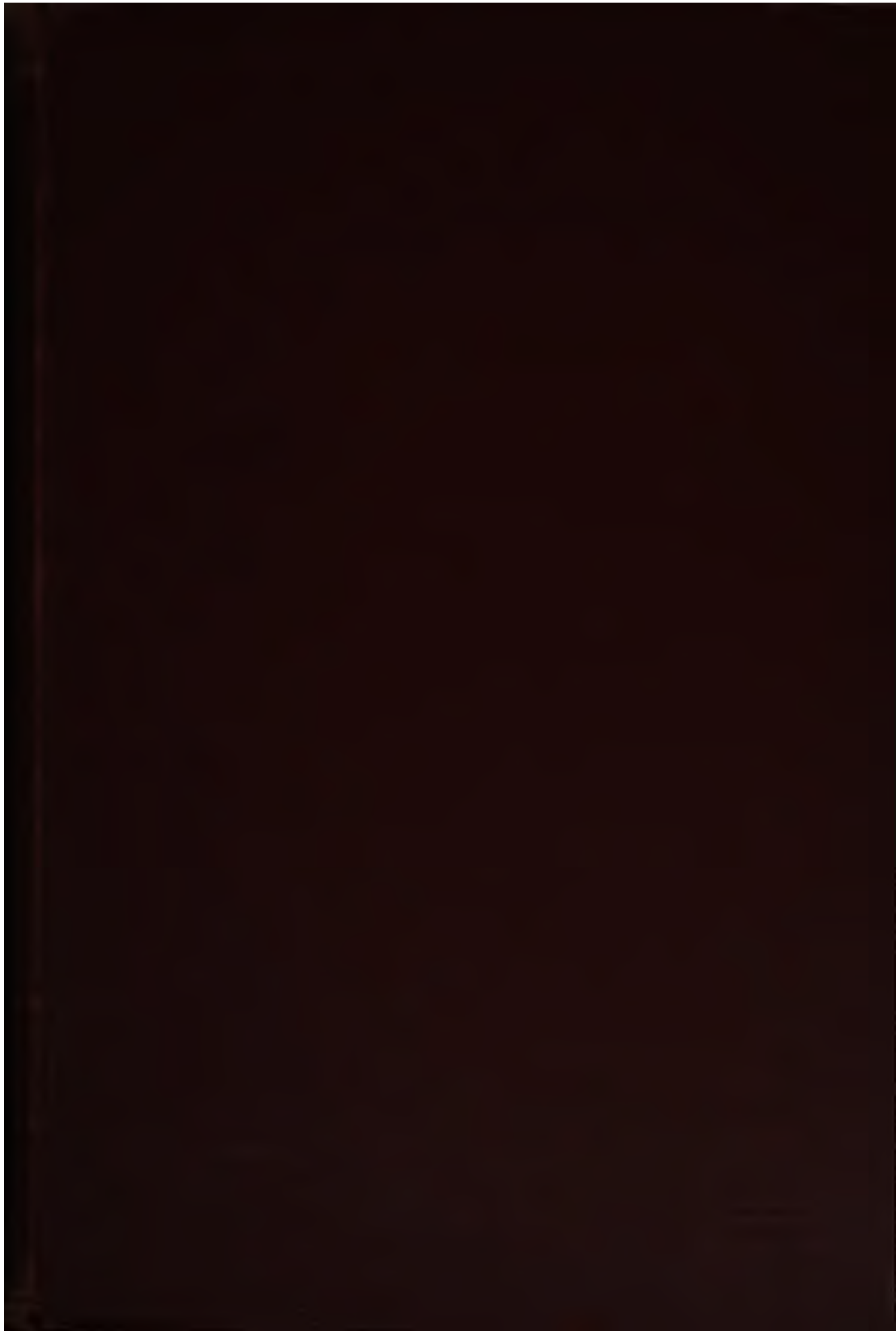
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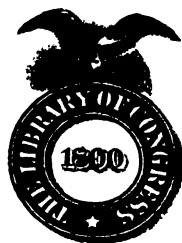
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FARMERS' REGISTER,

A MONTHLY PUBLICATION

Devoted to the improvement of the Practice,

AND

SUPPORT OF THE INTERESTS OF AGRICULTURE.

EDMUND RUFFIN, EDITOR AND PROPRIETOR.

And he gave it for his opinion, "that whoever could make two ears of corn, or two blades of grass to grow upon a spot of ground where only one grew before, would deserve better of mankind, and do more essential service to his country, than the whole race of politicians put together." *Swift.*

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THE FARMERS' REGISTER.

VOL. II.

JUNE, 1834.

No. 1.

EDMUND RUFFIN, EDITOR AND PROPRIETOR.

For the Farmers' Register.

SOME ACCOUNT OF THE AGRICULTURAL SOIL AND PRODUCTS OF MIDDLE FLORIDA, IN A LETTER TO THE EDITOR.

Sir:

Agreeably to the wish which you have intimated, I proceed to give you a sketch, though a hasty and imperfect one, of the agriculture, soil, and products of Middle Florida.

The Floridas were ceded by Spain to the United States by the treaty negotiated at Washington, in 1819, but it was not until the summer of 1821, that our flag waved in peaceful possession over the fortresses of Augustine, Pensacola, and St. Marks. Soon after this latter event, numbers of our people, with their characteristic enterprise, prepared to settle in the newly acquired territory; and about the year 1825, the resources of Middle Florida began to be developed. Up to the period of our acquisition of the Floridas, little was known of their internal condition, their soil, climate, &c., and the most contradictory opinions were entertained. But when Middle Florida had been penetrated and explored, and a country found possessing a large portion of fertile lands, with a beautifully undulating surface, and a climate, as it was fondly hoped,

"Where the flowers ever blossom, the beams ever shine;"

the most favorable impressions were made upon the public mind; the expectations of many were wrought up to an inordinate degree, and they indulged the belief that they would be able to unite there the various products of the temperate and torrid zones. Besides cotton, sugar cane, &c., many hastened to plant the orange, not doubting that, in due time, they would be gratified by the fragrance of its bloom, and the luxury of its fruit. But, in the full tide of experiment, "there came a frost, a killing frost." The memorable frost of the 6th of April, 1828, and those of the two succeeding winters, have demonstrated to the unwilling inhabitants of the interior of Middle Florida, that, with them, the orange cannot be produced in the open air. On the sea-coast and islands, however, no doubt can be entertained of the practicability of producing it, because it is produced in East Florida, in the same latitude, and on the sea-islands of Georgia, in a higher latitude.

With respect to sugar cane, the disappointments have been less signal and decisive, but the losses far greater. Its production and manufacture is an expensive process, and where any thing like a crop is attempted, a failure is attended with serious consequences. The failures which have been experienced here in this crop have resulted mainly from want of knowledge, and want of adequate preparations for "taking off the crop," that is, for grinding and boiling the cane. In common with Louisiana, however, much loss has resulted from the severe frosts of the last three winters. From my own experience, and from my observations in Louisiana and in Florida, I believe that in no part of the United States is the sugar cane so good a crop as cotton; *Quaque ipso miserrima*

vidi, et quorum pars fui. In the lower part of Louisiana, however, and in East Florida, that culture may be advantageously pursued, because there the climate is most favorable for cane, and the soil not so suitable for cotton. The high price of sugar which now prevails, and which is likely to continue, is an additional incentive to its production in those parts of the United States, which favor it most.

So much has, of late years, been written and published in the United States concerning the culture of the sugar cane, that I shall be brief in what I have to say on this subject.

Two sorts or species are cultivated in Florida, the Otaheite or Green Cane, and the Ribband Cane. The former attains the largest growth; the latter is a more hardy plant, and, therefore, better adapted to the vicissitudes of our climate. The mode of planting is in drills, from four to five feet apart; the cane laid horizontally in the trench or drill, two or three together, in order to insure a good stand. The time of planting may be at any time between the first of November and the first of April, when the temperature of the weather does not approach the freezing point, at which times the cane must not be taken from its beds, and exposed to the air. After it has come up, it is ploughed and hoed like cotton or Indian corn. About the middle of October, the grinding and boiling should be begun, as the lower part of the canes is then fit for sugar, and the tops for planting. But it is usual also to reserve a portion of the entire canes for planting. When the approach of frost is feared, the standing cane is cut off at the surface of the ground, and laid in large flat beds, or mattresses, in which situation, if the operation be properly performed, it is secure from the effects of frost. After this the grinding may be continued, and I have known sugar made from cane that had lain in mattresses for forty, fifty, and sixty days.

From the roots of the cane left in the earth, a second crop is obtained, which is called the "Ratoon crop," which ripens earlier and more perfectly than the crop from the plantings. It is desirable, therefore, to have one half the crop of each year from ratoons, in order that by mixing them, in boiling, the greater maturity of the one may compensate, in a degree, for the deficiency of the other. After severe winters, however, the ratoon crop has been found to fail to a greater or less extent. In this climate the ratoons can only be relied on for one year, and, without them, it requires from twenty to twenty-five per cent. of the whole crop to renew it. It is obvious that this alone, is a severe tax upon the sugar planter.

The cultivation of cotton which, at first, was but a secondary object with most of the settlers in Florida, has become the principal pursuit of the planters.

Three sorts or species of cotton are planted in Middle Florida. First, the common green-seed cotton, (*Gossypium herbaceum*) originally from India, and the Levant. Second, the Mexican cotton, (*Gossypium hirsutum*) Third, the sea-

island cotton (*Gossypium Barbadosense*?) which is a native of some of the West India Islands. The two former are *short staples*, the last is the *long staple* cotton. The modes of cultivating and ginning the latter differs from that of the two former, which is so well known in all the southern states.

The sea-island cotton being a plant of larger growth, requires more space than the two other species. On good soils it is not unusual to see it ten feet high. It is usual to make the beds or ridges larger, and to hoe it more carefully than the other sorts; but it may be doubted whether there is any essential difference in the plants, in this respect. It requires a longer season to mature its fruit than the others. The difference is probably about four weeks.

The short staple cottons are prepared for market with *saw-gins*, which do their work with great despatch. On the contrary, it is necessary to prepare the sea-island cotton with *roller-gins*, in order to avoid breaking the staple, and thus destroying that *length of fibre* which gives it its superiority over the other sorts of cotton. Of the roller-gins, there are several sorts, differing in the mode of construction, as the foot-gin, the horse-gin, &c., but all of which are slow in operation when compared with the saw-gin. Again, the product of this cotton, to the acre, is not so great as the other. But to compensate for these disadvantages, the price of it, when prepared for market, is usually about double the price of short staple cotton. On some of the sea-islands of South Carolina, a variety of the long staple cotton is produced (by a few planters) which is much finer than that which is ordinarily cultivated, and which commands about double the price of the latter, and quadruple the price of short staple cotton. The knowledge of it was for a long time a secret, confined to a few; but the seeds are now freely sold in the Charleston market, at from two to five dollars a bushel. At times when the prices of cottons have been high, this fine variety has commanded a dollar per pound, and the discoverer of it was offered, by a neighboring planter, \$50,000 for the secret!

As yet, however, the Mexican cotton is that which is most commonly cultivated in Middle Florida, but the soil and climate having been proved to be well adapted to the production of sea-island cotton, it is probable that, as the plantations are opened, and the pressure of out-door labor during winter becomes less, the proportion of this cotton will be increased.

The average product of this species of cotton may be stated at about six hundred pounds to the acre, though it is not unusual to obtain as much as eight hundred pounds. Its yield from the seed, is as one to three, while that of short staple cotton is a little more than one to four. During the past season, some planters of Mexican cotton have obtained seven, eight, and even nine bags to the hand, but the average is probably not more than four or five.

Cotton in this climate begins to bloom during the first week in June, and the picking may be commenced early in August. Sea-island cotton should be planted between the 10th of March and the 1st of April. Short staple cotton may be planted at any time from the 10th of March to the middle of May. The sea-island cotton is used for the finest cotton fabrics, and the finest sewing

cotton, and it is said to be used in France for adulterating their silks.

Spanish tobacco has been cultivated in Florida, and found to do well. Segars have been made of it which have all the perfume of good Havana segars. It is said to be a profitable crop.

The olive tree (*Olea Europæa*) has been tried, and found not to succeed. Col. John Gamble imported a number of trees from Marseilles, and planted them on his estate. He informs me that they have perished to the roots by frost, every winter since he planted them. And yet in the garden of my friend Dr. Wray, of Augusta, (Geo.) I have seen a young olive tree, which for several years, has borne the winters in the open air. Of the European olive, however, there are several varieties, and that which I saw in the garden of Dr. W. is not the one which is commonly cultivated, as it requires a much longer period to come to maturity. Like the orange tree, the olive would probably do well on the sea-coast and islands. I learn that the olive has been reared at Augustine, where oranges are also produced in abundance.

Indian corn does well, and the crop is easily made. It may be planted the first week in March, and the cultivation completed early in June. When the spring is favorable, it may be planted in February, and the cultivation completed in May.

Oats and rye do well, and ought to be extensively introduced to alternate with cotton and corn.

Wheat has been but little tried, and I am unable to say with what success.

In the soil of Florida there is great diversity. The reader, perhaps, has not to be told that a large portion of the country is occupied by *pine barrens*, as they are called. Even in these, there is great diversity, some being quite productive, while others are extremely barren. In the former, the pines (*pinus palustris*, the long leaf, pitch pine) grow large and tall, and are associated with the *Black Jack*, (*Quercus nigra*) in the latter they are stunted in growth, and are associated with the "barrens' scrub oak," (*Quercus Catesbei*) which, in common language, is often confounded with the "Black Jack."

The richest uplands are the Hammocks or *Hummocks*, a word which probably has its root in the Latin *humidus*, moist, or *humeo* to be wet, indicating in this instance, not a wet or swampy soil, but its contiguity to some body of water, either a creek, river, or lake.* Intermediate between these are the *oaky lands*, which have a stiffer soil than the others, and by many are thought to excel the hammocks in the production of cotton. The frequency and suddenness with which these soils change from one to another, surprises every observer, and baffles every theory to account for it. Frequently after passing a dreary tract of pine-barrens, or barren sand-hills, you come, suddenly, on the borders of a hummock, which greets you like an oasis in a desert, contrasting with the former fertility of its soil, and the beauty of its numerous evergreens.†

* Or perhaps in allusion to the humidity of its atmosphere, as the branches of the trees and their dense foliage detain the evaporation, and keep up a degree of moisture very favorable to the growth of parasites, as the Long Moss, Mistletoe, Epidendrum, &c.

† Pre-eminent among these stands the stately Mag-

Marl is not rare in Florida, and the whole country being based on a shell rock, it is, probably, abundant, and will, in due time, be developed. I have myself seen some very fine specimens.

Very respectfully, yours,

H. B. CROOM.

Lake Lafayette, near Tallahassee, March, 1834.

P. S. With respect to fruits, I may state, that peaches do very well, though they are sometimes destroyed by the spring frosts. Apples, pears, cherries, &c. have not been sufficiently tried. The number of wild plums in this country, is remarkable. A species of gooseberry (*Ribes rotundifolium* of Michaux?) grows wild in the hammocks, and from the quantity of subalpine growth, it might be inferred that this country would prove favorable to the production of most of the fruits of temperate climates. But the fact remains to be tested. Strawberries grow as large and as fine as I have seen them in any country. They are now ripening abundantly. (March 31st.)

Some corn which I planted about the 20th of February last, came up in due time, has been ploughed and hoed once, and is now thrifty and promising. It is probable that two crops of corn might be made in one season, if it were desirable to do so. But late corn in this climate is apt to be attacked by worms, while in roasting ear.

THE WILD ONION.

To the Editor of the Farmers' Register.

Cambridge, Md. April 18, 1834.

Will you allow me through the medium of the Farmers' Register, to make the inquiry of your numerous correspondents, whether there is any effectual mode, and what it is, of extirpating that most destructive of all weeds, the wild onion?

I purchased several years ago, a farm near Cambridge, of poor clay soil, filled with starveling onions. I had always been impressed with the idea, that heavy manuring would eradicate them, by the substitution of other vigorous vegetation; but experience teaches me the error of that opinion. I have made the land extremely rich, yet the onions have increased in number, and in vigor of growth, *pari passu* with the improvement; and now at this moment, my wheat field exhibits the mortifying spectacle of a serious and doubtful conflict, between these best and worst of the vegetable creation; and I fear the onions will bear the palm.

An answer to my inquiry will confer an obligation on,

Yours, very truly. J. E. M.

P. S. Has an effectual onion riddle ever been invented?—by whom?—and, where may it be obtained?

J. E. M.

nolia Grandiflora, accompanied by its relative the fragrant *Magnolia Auriculata*, the *Olea Americana*, *Hopsea tinctoria*, *Ilex Opaca*, *Prunus Caroliniana*, &c. Here too, are the Red-bud and the Beech, the elegant *Stuartia*, the showy *Hydrangea*, and the gay *Azalea*. These are often entwined about their trunks by these elegant creepers, the *Carolina Jessamine*, the Coral *Honeysuckle*, the *Decumaria Sarmientosa*, the luxuriant *Cissus*, and the splendid *Bignonias*, while the *Tillandsia Resneoides* festoons their branches! Such is a Florida hammock—the pride of Flora, and the paradise of botanists.

A BREEDING MULE.

To the Editor of the Farmers' Register.

*Spring Hill, Nansemond county, }
2d May, 1834.*

A circumstance has occurred on my plantation, which seems to be against the general principles of nature. On the 23rd of April, 1834, a female mule of mine, had a colt, never suspected by me until I saw its birth. I had worked her hard all last year, upon the farm, and on the rail road, through the winter hauling marl, and all the month of March hauling logs, from a distance of two miles, six loads a day, and thirty logs each load, making twenty-four miles each day. She was at work all April hauling out manure, until the 23d. On that day I had gone, a little time before night, from the labors of the day, owing to one of my family being sick; and about 5 o'clock in the evening, the boy that drove the mule, came running to the house, saying that Jenny (for that was her name) had a colt. I went out and in a few minutes thereafter, the thing (for I know not what to call it) was delivered, and is now doing well. I never suspected the mother's being with foal, because I thought it contrary to nature, though I had for four or six weeks observed that her belly was enlarged, and so much so, that the cart had to be altered, as it rubbed her. She showed no other sign—so I did not suspect it. She has little or no bag, though I believe she gives a plenty of suck, as her child is now getting fat. At first it was very poor. Now you will ask what is the father of it? I cannot say—but believe, a colt of mine, now three years old. He ran out on Sundays, with the mules, and the black boy tells me that there was cause for such an effect. So it is, the mule has a colt, and it is exactly like the young stallion. If this is a matter of curiosity, you may give publicity to it, under my name. Hundreds can prove the fact—and several can testify that they were present at the birth.

JOHN THOMPSON KILBY.

P. S. The mother certainly is a mule, for she was foaled mine, and is now ten years old.

[The fact stated by Mr. Kilby is particularly interesting, because so authenticated as to leave not the slightest ground for doubt. But though it is contrary to the general operation of a law of nature, for any mule or hybrid animal to be capable of procreation, it is well known to naturalists that there have been some (though rare) exceptions to the rule. Whether in these cases the offspring is barren, according to the general and wise provision of nature, to prevent the continuance of mongrel breeds, or not, has not yet been determined].

YELLOW (OR WILD) LOCUST.

The Genesee Farmer of April 5th, says that "yellow locust seed is worth \$4 or \$5 the pound—say \$1 the half pint. And trees of suitable size for setting may be had at several nurseries in Western New York at \$6 per hundred." At these prices, it would be a profitable employment of labor to gather the ripe pods of the wild locust, where they are produced abundantly, as on the high calcareous banks of the lower James River.

For the Farmers' Register.

FECUNDITY OF A EWE.

I think it was on the 25th of January, 1833, that the only ewe with black wool in my flock, (and which, therefore, could not be mistaken for any other,) had a lamb. On the 20th of April, following, that lamb was killed, and eaten. On the 25th of the same month and year, (the ewe running upon a good clover field) the same ewe took the ram—(a broad-tail, since, unfortunately, dead.) On the 16th of July, the same ewe had a lamb, as I was first informed by one of my family, (the sheep being then grazing in a lot around the house,) and I went out and found it so. That lamb was not killed, and is still living. From the 16th to the 20th of September, in the same clover field, the ewe again took the ram; and during one of those snows, either in January or February, last past, the boy that attends the sheep says, that one morning upon going to the fodder stacks, where the sheep were kept, he found that this same ewe had lost a lamb—making two births and a miscarriage in twelve or thirteen months. Probably the miscarriage was occasioned by some hurt the ewe might have received.

How long do ewes go with lamb? I have believed about four months and twenty days; if so were not her births premature? I ask for information.

OBSERVER.

10th April, 1834.

BARKING TREES.

From Goodsell's Genesee Farmer.

It often happens that fruit trees, more particularly apple and pear trees, are stripped of their bark during the winter by sheep, rabbits, or mice. When such accidents do happen, such trees should not be looked upon as lost, but as soon as the sap begins to circulate freely in the spring, they should be repaired, by fitting in pieces, on every side, to keep up the circulation, between the top, and the roots.

The following directions, will enable those who shall be so unfortunate as to have any of their trees injured by mice, or otherwise, to repair them without incurring any great expense.

Where the bark has been taken from the bottom of a tree, as soon as it is discovered, it should be covered up to prevent the wood from becoming dry. During the month of May, uncover the wood, and with a chisel, or some other instrument, cut off from the tree, so much wood as will leave a flat surface, equal in width, to the piece to be inserted. Let this extend so far up and down as to reach the sound bark, and make the cut square in at the ends. Procure a piece of wood from a growing tree of the same kind, whether apple or pear, cut it of a suitable length, split off a piece from one side of it, cut the ends smooth with a knife, being careful not to bruise the bark, fit it closely into the place prepared in the side of the tree, having the greatest proportion of the sap flow, or line between the bark and wood, that can be, come in contact. Proceed in the same way on different sides of the tree, after which bind the whole part with some bark, or strings made from flax, and cover the whole with earth, if it does not extend too far up the tree. If the bark was removed too far up, to be convenient for covering with earth, take some strips of cotton cloth, dip

them in melted grafting wax, and wind them on in such a manner as to make the whole air tight. If well done the pieces will unite at both ends, and soon extend so as to cover the wound.

WOOD SNAPPING ON THE FIRE.

From the Genesee Farmer.

I believe we have no wood in this country that is more worthless for fuel than the Butternut. A few cuts of this kind, however, about ten inches in diameter, had been split in two, left some weeks to dry, and then carried into my chamber. On placing one stick on the fire, it began to snap most remarkably: sometimes there were not less than fifteen or twenty sparks on the carpet at once; and the inconvenience was serious. What was to be done? I happened to recollect a paragraph in your second volume, taken from some eastern paper, stating that *wood snaps on the fire from the side nearest to the heart*. It was so in this case. I just turned the log over, and at once the difficulty was at an end; for though it continued to snap for some time against the back plate, yet no more sparks came into the room.

When I put on the next log, I was particular to turn the heart backwards, and I have had no trouble from snapping since. Now the knowledge of this thing is but a trifle indeed, but it may be worth knowing, for I have often seen the guests round a parlor fire starting up to put out the sparks, when I presume nothing more was wanting than to turn over a stick.

A FARMER.

LIVE HEDGES.

Extracts from the New England Farmer.

"For the last twenty years I have paid great attention to this subject, and will give you the result of my experience. The first hedge I set out (about 500 feet in length) was of the English hawthorn or quickset. The result was decidedly unfavorable. The plant is not adapted to this climate—it appears better suited to the moist atmosphere of England; our long summer drought injures it; it is peculiarly subject to the attacks of the borer; a species of mildew or blight almost invariably assails it early in August, by which it loses its leaves, and by the middle of August or first of September assumes a wintry appearance.

"My next experiment was with the three thorned acacia, recommended by Judge Buel. The hedge was not more than fifty feet in length, but was placed in excellent soil and carefully attended. I had supposed that the long thorns with which the plant is armed, would have made it peculiarly efficacious as a fence. The result was even more unfortunate than before. Prune and clip it as I would, I could never make it grow thick; it appears to have a decided tendency to shoot upwards rather than to spread; the thorns grow only upon or near the upper branches, and below there was nothing but the bare stems to serve as a fence. It would often, too, lose as much during a hard winter, as it had grown during a whole summer. After a trial of near ten years I dug up the whole and replaced it with the American buckthorn, (*Rhamnus catharticus*.) With this I have been completely successful. It has, it is true, but few thorns, but it grows naturally so thick as to be a complete protection to the land enclosed by it. It shoots early in the spring, and holds its verdure till very late in the fall. If properly managed, it

is so close below that a rabbit could scarcely work its way through; while above, the strong branches are so wattled and interlaced, that a man could not scale it, nor a bull force his way through it.

"I have now in different places at least half a mile of this hedge, which I shall be very happy to show to any of your correspondents who may wish to see it.

"The mode of cultivation is very simple—it is set out either in the fall or spring in the manner recommended by Judge Buel; if in the fall, it is clipped the next spring within about nine inches of the ground. Next spring it is clipped again at the height of about two feet, the third spring at about three feet from the ground, with some side pruning. The next summer your hedge is complete, and you may keep it at the height and thickness desired at the expense of a little pruning.

"I have also tried plashing. In 1818 or 19, my gardener, who was an Englishman, highly recommended it, and at last persuaded me to let him attempt it upon a young and thrifty hedge made of crab apple. He did it as it appeared to me, very skilfully, but it was a very long and tedious operation, and the result was the hedge was ruined. His mode of operating (which is I believe the common one) was to suffer the main stem to remain upright, while all the side ones were partially cut and bent down nearly horizontally, and so confined either by interlacing or by staking them down; they did not thrive however—they perished by degrees, and I was at last forced to prune away all the horizontal branches, and lost at least four year's growth.

"With the buckthorn I have never found plashing to be in any degree necessary or useful. If managed in the way I have described, in three years the hedge will be complete, requiring afterwards very little care, and nearly as thick, and quite as impervious below as above."

"Buckthorns should be set in a single row, from seven to nine inches apart; as soon as they begin to vegetate, they should be headed down to about six inches from the ground, which will cause the hedge to become thick from the bottom. By keeping the ground clean, and occasionally shortening the stray shoots, it will soon make a beautiful and efficient fence. It is an extremely vigorous, free growing plant, and in our opinion superior to any plant we are acquainted with in this country, for making a hedge."

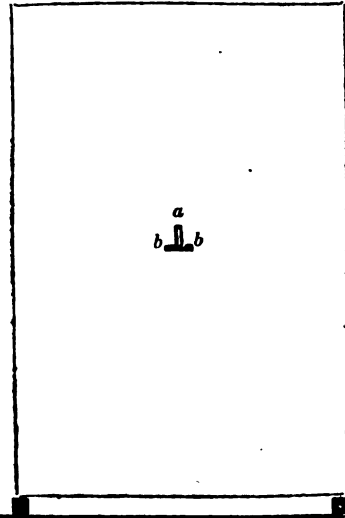
A WORD IN SEASON, OR AN EFFECTUAL SECURITY AGAINST THE BEE MOTH.

For the Farmers' Register.

As soon as your bees commence working in the spring, examine your hives, and with a slab of wood, or piece of hoop iron, scrape the stand immediately under the hive, also around the inner edges of the box, taking care to remove all the web that may be attached to any part of the stand or hive, as the whole secret consists in keeping them free from the web formed by the moth or fly. Having completed this operation, provide yourself with four square blocks of wood, and place one under each corner of your hive, so as to raise it not quite half an inch from the stand; this will enable you to clean the stand without removing the hive. This scraping operation must be repeated every three or four days, if there should be

any appearance of web forming on the stand, or around the inner edges of the hive. It seems necessary to remark, that the moth or fly, makes its attacks by a kind of regular approach, first forming its web on the stand, and then extending it up the sides of the hive until it gets complete possession. By a little attention in cleaning the stand and hive, as directed, you will certainly secure your bees from the ravages of the worm. In the winter, the blocks must be removed from under the hive, so as to allow it to rest immediately on the stand, which will secure it against the attacks of mice, &c. On this plan, it is advisable to make an entrance for the bees, by cutting a perpendicular slit in the front part of the hive, half way from the bottom, say two and a half inches in length, and one-eighth of an inch wide, with a kind of shelf just under it to serve as a resting place for the bees going and returning to the hive. After being a little used to it, the bees seem to prefer this entrance to the one at the bottom of the hive. This plan has proved an effectual security against the worm, after every other remedy has failed; and not a single hive has been lost since it was adopted.

Z.



(a) Entrance, one-eighth of an inch wide, and two and a half inches long.

(bb) Shelf below the entrance.

MATERIALS FOR MANURE.

Extract from an article by J. H. Couper, in the Southern Agriculturist.

A sufficient amount of manure is yielded to keep the soil in the most productive state, if a stock of animals be kept on the plantation, and the dry vegetable matter of the fields be carefully carted to the pens. The expressed cane, tops and leaves, from an acre of cane, yield about 10,000 lbs. of dry vegetable matter. An acre of corn, including blades, stalks, shucks and cobs, about 2500 lbs., when the yield of corn has been 20 bushels: and the after crop of peas 1000 lbs., together 4500 lbs. An acre of solid peas 2000 lbs. The potatoe vines, pumpkins and turnips, being eat green, contribute only to the production of fluid manure. The total quantity of dry vegetable matter to be

applied to the manuring of 16 acres in crop, will therefore be,

4 acres in corn, at 4500 lbs. per acre, 18,000 lbs.

1 " peas and turnips, 2,000

3 " cane, at 10,000 lbs. 30,000

50,000

which, if merely rotted by rain, will yield 100,000 lbs. of manure; and if rotted by the urine and dung of stock, from 150,000 lbs to 200,000 lbs., or at least 25,000 lbs. of manure to each of the 4 acres proposed to be manured. To this supply of manure, must be added from 50 to 70 bushels of cottonseed, from seven acres of cotton, to be applied to the four acres of corn; and the peas that are ploughed in, preparatory to the potatoe crop of vines.

MATERIALS FOR CORDAGE.

For the Farmers' Register.

Dr. Perrine, American Consul at one of the Mexican ports, has asked of Congress a grant of land in the peninsula of Florida, for the purpose of introducing and cultivating the *Agave Americana*, (the famous centennial Aloe) which he recommends as a material for cordage. It is indeed much used for that purpose in Mexico and South America, where its growth is spontaneous. There is no doubt that this plant would do well in any part of the peninsula of Florida, for it bears the winters at Charleston, S. C. and at Augusta, Geo. If, however, its cultivation is likely to prove profitable, I see no reason why congress should be asked to give lands for the purpose; and if not, we had then better let it alone.

If any additional material for cordage is requisite or desirable in this country, we have one in a native plant, probably not inferior, for that purpose, to the *Agave Americana*. I allude to the *Yucca filamentosa*, which grows spontaneously in light sandy soils, (and often on the very poorest) from Virginia to Florida, and is commonly known under the name of *Bear grass*, and sometimes under that of *Silk grass*. The fibres of this plant are remarkable for their strength, and I have seen ropes made of it, equal in strength and appearance to any other. To obtain the fibres, the leaves are "rotted" in water, or by burying them in the earth. Mr. Elliott, in his "Sketch of the Botany of South Carolina and Georgia," says of this plant, that "it appears to possess the strongest fibres of any vegetable whatever; and, if it can be raised with facility, may form a valuable article in domestic economy." The root is also a substitute for soap in washing woollens.

Of the facility of its production, I entertain no doubt. No plant is more hardy, or bears transplanting better. Its roots are extensive, having numerous eyes, or buds, and each one of these will produce a plant. There are millions of acres in the southern states unfit for the ordinary purposes of agriculture, which would produce this plant very well.

H. B. C.

A FLOOD OF THE MISSISSIPPI.

Many of our larger streams, such as the Mississippi, the Ohio, the Illinois, the Arkansas, and the Red River, exhibit, at certain seasons, the most extensive overflowings of their waters, to which the name of *floods* is more appropriate than the term *freshets*, usually applied to the sudden risings

of small streams. If we consider the vast extent of country through which an inland navigation is afforded by the never-failing supply of water furnished by these wonderful rivers, we cannot suppose them exceeded in magnitude by any other in the known world. It will easily be imagined what a wonderful spectacle must present itself to the eye of the traveller, who, for the first time, views the enormous mass of waters collected from the vast central regions of our continent, booming along, turbid and swollen to overflowing, in the broad channels of the Mississippi and Ohio, the latter of which has a course of more than a thousand miles, and the former of several thousands.

To give you some idea of a *booming flood* of these gigantic streams, it is necessary to state the causes which give rise to it. These are the sudden melting of the snows on the mountains, and heavy rains continued for several weeks. When it happens that, during a severe winter, the Alleghany mountains have been covered with snow to the depth of several feet, and the accumulated mass has remained unmelted for a length of time, the materials of a flood are thus prepared. It now and then happens that the winter is hurried off by a sudden increase of temperature, when the accumulated snows melt away simultaneously over the whole country, and the south easterly wind which then usually blows, brings along with it a continued fall of heavy rain, which mingling with the dissolving snow, deluges the alluvial portions of the western country, filling up the rivulets, ravines, creeks, and small rivers. These delivering their waters to the great streams, cause the latter not merely to rise to a surprising height, but to overflow their banks, wherever the land is low.—On such occasions, the Ohio itself presents a splendid, and at the same time, an appalling spectacle; but when its waters mingle with those of the Mississippi, then kind reader, it is the time to view an American flood in all its astonishing magnificence.

At the foot of the falls of the Ohio, the water has been known to rise upwards of sixty feet above its lowest level. The river at this point, has already run a course of nearly seven hundred miles from its origin at Pittsburgh, in Pennsylvania, during which it has received the waters of its numberless tributaries, and overflowing all the bottom lands or vallies, has swept along the fences and dwellings, which have been unable to resist its violence. I could relate hundreds of incidents which might prove to you the dreadful effects of such an inundation, and which have been witnessed by thousands besides myself. I have known, for example, of a cow swimming through a window elevated at least seven hundred feet from the ground, and sixty-two above low water mark. The house was then surrounded with water from the Ohio, which runs in front of it, while the neighboring country was overflowed; yet the family did not remove from it, but remained in its upper portion, having previously taken off the sashes of the lower windows, and opened the doors. But let us return to the Mississippi.

There the overflow is astonishing; for no sooner has the water reached the upper part of the banks, than it rushes out and overspreads the whole of the neighboring swamps, presenting an ocean overgrown with stupendous forest trees. So sudden is the calamity, that every individual, whether man or beast, has to exert his utmost ingenuity to ena-

ble him to escape from the dreaded element. The Indian quickly removes to the hills of the interior, the cattle and game swim to the different stripes of land that remain uncovered in the midst of the flood, or attempt to force their way through the waters until they perish with fatigue.

Along the banks of the river the inhabitants have rafts ready made, on which they remove themselves, their cattle, and their provisions, and which they then fasten with ropes, or grape vines, to the larger trees, while they contemplate the melancholy spectacle presented by the current, as it carries off their houses and wood yards piece by piece. Some who have nothing to lose, and are usually known by the name of *squatters*, take this opportunity of traversing the woods in canoes, for the purpose of procuring game, and particularly the skins of animals, such as the deer and bear, which may be converted into money. They resort to the low ridges, surrounded by the waters, and destroy thousands of deer, merely for their skins, leaving the flesh to putrify.

The river itself, rolling its swollen waters along, presents a spectacle of the most imposing nature. Although no large vessel, unless propelled by steam, can now make its way against the current, it is seen covered by boats laden with produce, which running out from all the smaller streams, float silently towards the city of New Orleans, their owners, meanwhile, not very well assured of finding a landing place even there. The water is covered with yellow foam and pumice, the latter having floated from the rocky mountains of the north-west. The eddies are larger and more powerful than ever. Here and there tracts of forests are observed undermined, the trees gradually giving way, and falling into the stream. Cattle, horses, bears and deer, are seen at times attempting to swim across the impetuous mass of foaming and boiling water; whilst here and there a vulture or an eagle is observed perched on a bloated carcass, tearing it up in pieces, as regardless of the flood as on former occasions, it would have been of the numerous *savoyers* and *planters* with which the surface of the river is covered when the water is low. Even the streamer is frequently distressed. The numberless trees and logs that float along, break its paddles and retard its progress. Besides, it is on such occasions difficult to procure fuel to maintain its fires; and it is only at very distant intervals that a wood-yard can be found which the water has not carried off.

Following the river in your canoe, you reach those parts of the shores that are protected against the overflowing of the waters, and are called *levees*. There you find the whole population of the district at work, repairing and augmenting those artificial barriers which are several feet above the level of the fields. Every person appears to dread the opening of the *crevasse*, by which the waters may rush into his fields. In spite of all exertions, however, the *crevasse* opens, the water bursts impetuously over the plantations, and lays waste the crops which so lately were blooming in all the luxuriance of spring. It opens up a new channel, which, for aught I know to the contrary, may carry its waters even to the Mexican Gulf.

I have floated on the Mississippi and Ohio, when thus swollen, and have, in different places, visited the submersed lands of the interior, propelling a light canoe by the aid of a paddle. In this man-

ner I have traversed immense portions of the country, overflowed by the waters of these rivers; and, particularly whilst floating over the Mississippi bottom-lands, I have been struck with awe at the sight. Little or no current is met with, unless the canoe passes over the bed of a bayou. All is silent and melancholy, unless when the mournful bleating of the hemmed-in deer reaches your ear, or the dismal scream of an eagle or raven is heard, as the foul bird rises, disturbed by your approach, from the carcass on which it was allaying its craven appetite. Bears, cougars, lynxes, and all other quadrupeds that can ascend the trees, are observed crouched among their top branches. Hungry in the midst of abundance, although they see floating around them, the animals on which they usually prey, they dare not venture to swim to them. Fatigued by the exertions which they have made in reaching the dry land, they will there stand the hunter's fire, as if to die by a ball were better than to perish amidst the waste of waters. On occasions like this, all these animals are shot by hundreds.

Opposite the city of Natches, which stands on a bluff bank of considerable elevation, the extent of inundated land is immense, the greater portion of the tract lying between the Mississippi and the Red River, which is more than thirty miles in breadth, being under water. The mail-bag has often been carried through the immersed forests, in a canoe, for even a greater distance, in order to be forwarded to Natchitoches.

But now, kind reader, observe this great flood gradually subsiding, and again see the mighty changes which it has affected. The waters have now been carried into the distant ocean. The earth is every where covered by a deposit of muddy foam, which, in drying, splits into deep and narrow chasms, presenting a reticulated appearance, and from which, as the weather becomes warmer, disagreeable, and at times noxious exhalations arise, and fill the lower stratum of the atmosphere, as with a dense fog. The banks of the river have almost every where been broken down in a greater or less degree. Large streams are now found to exist, where none were formerly to be seen, having forced their way in direct lines from the upper parts of the bends. These are, by the navigator called *short-cuts*. Some of them have proved large enough to produce a change in the navigation of the Mississippi. If I mistake not, one of these, known by the name of *Grand Cut-off*, and only a few miles in length, has diverted the river from its natural course, and has shortened it by fifty miles. The upper parts of the islands present a bulwark, consisting of an enormous mass of floated trees of all kinds, which have lodged there. Large sand banks have been completely removed by the impetuous whirls of the waters, and have been deposited in other places. Some appear quite new to the eye of the navigator, who has to mark their situation and bearings in his log-book. The trees on the margins of the banks, have in many parts given way. They are seen bending over the stream, like the grounded arms of an overwhelmed army of giants. Every where are heard the lamentations of the farmer and planter, whilst their servants and themselves are busily employed in repairing the damages occasioned by the floods. At one *crevasse*, an old ship or two, dismantled for the purpose, are

sunk, to obstruct the passage opened by the still rushing waters, while new earth is brought to fill up the chasms. The squatter is seen shouldering his rifle, and making his way through the morass, in search of his lost stock, to drive the survivors home, and save the skins of the drowned. New fences have every where to be formed; even new houses must be erected; to save which from a like disaster, the settler places them on an elevated platform, supported by pillars made of the trunks of trees. The lands must be ploughed anew, and if the season is not too far advanced, a crop of corn and potatoes may yet be raised. But the rich prospects of the planter are blasted. The traveller is impeded in his journey, the creeks and smaller streams having broken up their banks in a degree proportionate in their size. A bank of sand, which seems firm and secure, suddenly gives way beneath the traveller's horse, and the next moment the animal has sunk in the quick-sand, either to the chest in front, or over the crupper behind, leaving its master in a situation not to be envied.

Unlike the mountain torrents and small rivers of other parts of the world, the Mississippi rises but slowly during these floods, continuing for several weeks, to increase at the rate of about an inch in the day. When at its height, it undergoes little fluctuation for some days, and after this subsides as slowly as it rose. The usual duration of a flood is from four to six weeks, although, on some occasions, it is protracted to two months.

Every one knows how largely the idea of floods and cataclysms enters into the speculations of the geologist. If the streamlets of the European continent afford illustrations of the formation of strata, how much more must the Mississippi, with its ever-shifting sand banks, its crumbling shores, its enormous masses of brist timber, the source of future beds of coal, its extensive and varied alluvial deposits, and its mighty mass of waters rolling sullenly along, like the flood of eternity.

DISEASES OF HOGS.

From the Genesee Farmer.

MR. L. TUCKER—I am engaged in milling, and have kept a stock of about three hundred hogs in a large frame pen, divided into twenty-four rooms, with plank floor, and lodging rooms covered and boarded, leaving open only sufficient room for them to enter. They have been fed on bran, shorts, and cross middlings. I have lost, during the last winter, about fifty—many of them were fat, and would weigh two hundred when dressed.

They were taken with weakness in the back, and lose the use of their hind parts—generally live from two to three weeks. On opening them, have always found a great many slim worms about an inch long in the leaf and about the back bone. I have tried all medicine recommended by farmers in this section, and in no instance had a cure.

I have a neighbor, who purchased a drove last fall, and has given them seven hundred dollars worth of corn, and the stock now left are not worth the first cost in consequence of the same disease.

You or your correspondents will confer a favor by giving me such information as you or they possess, respecting a remedy.

Yours, respectfully, R. H. H.
Venice, Huron co., (Ohio,) April 2, 1834.

ODDS AND ENDS.

To the Editor of the Farmers' Register.

Brunswick, March 31, 1834.

I shall be glad to learn from some of the readers of the Farmers' Register, what I have been trying for thirty years in vain to find, a good and sure method to destroy lice on hogs, cows, and horses. A decoction of tobacco will kill the lice, but will not destroy the nits. I have frequently sheared hogs for this purpose, and it is the best means to rid them of lice: but shearing a hog is a tedious job, which no one will be anxious to repeat.

What is the best remedy for worms in horses?

By what means can house flies be destroyed, or rendered less numerous and troublesome?

What safeguard can be used against the worm which cuts off young corn at the first joint in low grounds? I am sometimes compelled to plant mine three or four times, before I can get it to stand.

What will prevent the ravages of the fly which eats tobacco plants? Mine have been often almost entirely destroyed by these insects. But I am now mostly a cotton planter—though the rot and low prices together, have made me almost heartless.

When I plant tobacco in lots where I can plough it well, I throw up beds of thirty-nine inches wide, with a two-horse plough, and stick the plants about twenty inches apart, on the middle of each bed. I never prime (or take off the lower leaves) when I top the plants: but when they are hilled up, some of the small leaves are taken off—such as probably were on the young plant when first set out. Planting from the 1st to the 10th of June, is preferred to any other time. I generally top high, if the season and the land will permit—and if I can get the top leaves to make, (or mature) it is all I want. The cold dews, late in the growing season, help tobacco very much. I am much in favor of packing tobacco loose in the hogshead, (or without tying the leaves in bundles,) because, if it is manufactured in this country, it takes much trouble to untie the six-leaf bundles, and then the tie-leaf is worth but very little. It seems strange to me that any one should approve of these small bundles.

I planted a small kind of speckled pea in the same piece of land for three or four years. Those made the last year that I planted them, were coal black, and as late as any other pea. To what can this remarkable change be ascribed? J. K.

AGE OF SHEEP.

From the Mountain Shepherd's Manual.

The age of a sheep may be known by examining the front teeth. They are eight in number, and appear during the first year, all of a small size. In the second year, the two middle ones fall out, and their place is supplied by two new teeth, which are easily distinguished by being of a larger size. In the third year, two other small teeth, one from each side, drop out and are replaced by two large ones; so that there are now four large teeth in the middle, and two pointed ones on each side. In the fourth year the large teeth are six in number, and only two small ones remain, one at each end of the range. In the fifth year the remaining small teeth are lost, and the whole front teeth are large. In the sixth year the whole begin to be worn; and in the seventh, sometimes sooner, some fall out or are broken.

To the Editor of the Farmers' Register.

EXHAUSTING AND IMPROVING CULTIVATION.

Powhatan, April 13th, 1834.

I have, for some time, desired that some one would undertake to correct the evils prevailing in our county, to the devastation and entire destruction of the value of our lands, by hard and excessive culture, and which ought to have opened the eyes of more gentlemen who are really practical farmers, well-informed, and influential in many laudable things, but who appear to me, to have yielded without a struggle to this ruinous system of management. By pursuing this course, detrimental to their own interest and diminishing the wealth of our beloved commonwealth, they have already caused, and will continue to produce that abandonment of their native state and emigration to the west, which has been forced upon our people by their increasing necessities. That this diminution in the value of our lands is too much owing to neglect and bad management, and that an improved plan of cultivation will, with but little additional industry, effect a very great and desirable change in the present gloomy appearance of our lands, must, I think, be evident to all who bestow even a slight degree of attention on this important subject. To reclaim our exhausted lands, is not so impracticable as it has been considered; but it requires the dissemination of information acquired by experience, and the free interchange of opinion on agricultural subjects. The work in which you have engaged, is a proper channel for the communication of this mutual instruction, which I look upon as a safeguard of our happiness, and a harbinger of our future prosperity; and I consider it the duty of each subscriber to the 'Register,' to contribute all in his power to the general stock of information. Under a sense of this duty, and not with a vain expectation of imparting any material benefit to my brother farmers, I have been induced to address you; and I have been the more encouraged to do so, from having already observed the good which has resulted from the communications of some of your earlier correspondents.

Having for eight or ten years past, been in the habit of partially grazing my land, and having found, as I supposed, an improvement therefrom, I took up an idea that by pursuing this course, with the addition of all my manure, (a scanty portion however,) I could restore my farm to its original productiveness. But the period within which I had hoped to effect this desirable change passed away, and instead of improving, I had impoverished my land. I determined, therefore, to resort to clover; and in 1831 I sowed a lot of about twenty-four acres with twenty gallons of clover seed. Upon about one-third of this lot, immediately after sowing, I scattered the chaff of three crops of wheat, which had a very happy effect: for although the whole of the seed took tolerably well, it came up much thicker upon this portion of the lot, and would have produced more than twice the quantity, by weight, had it been cut and tried. The clover here lodged. It should be mentioned however, that the land on this part of the lot was better than the rest. In April, twelve months after the clover was sown, I had plastered it with one ton of plaster to the whole. This clover was turned under last August, (1833) with double ploughs, breaking the land to the depth of six or eight inches.

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I then, with a couple of large two-horse drags, harrowed the land the same way it was broken up, which smoothed the surface, although the weather was very dry. On the 27th of September, following, I commenced sowing upon this lot about twenty-five bushels of wheat, harrowing it the same way that the land was ploughed, and lapping about half the width of the harrows, by which means the land was gone over twice, the lapped part finishing the work as it went on; the hoe hands followed, chopped over, cleared out the water-furrows, and grips, and broke up all the clods. The prospect for a crop is, at this time, very promising, and I shall not be much mistaken in my calculation when I say that the product will be more than seventy-five per cent. greater than I have ever made from the same land. I am confident that I have added to the fertility of this land more in two years than could have been done in six, in the way I at first attempted its improvement; and that by some similar course of culture, land may be so highly improved, that a crop of small-grain will lodge upon it, and render the cultivation of other crops necessary to reduce its exuberant fertility.

Having abandoned the three-shift system altogether, and pursuing now a different mode of cultivation, I may hereafter give you the results of my experience, when I have acquired more than I now possess. In the mean time, it may be not uninteresting, to give you some account of the present state of my little farm. It consists of about two hundred and thirty acres, divided by a fence running nearly through the middle of the plantation. On one side of this fence is the fresh land, being the smallest portion, and containing about one hundred acres, which is already sown in wheat and clover; (the clover up tolerably well;) on the opposite side are one hundred and thirty acres of land, much more lean. Each of these divisions will be subdivided by turning-rows, so as to make two fields of fifty acres on one side, and two of sixty-five on the other side of the fence. It is not my intention, however, to commence with corn upon any one of my fields until the year 1836: in the meantime the division of one hundred and thirty acres is to be fallowed in the course of this summer, and laid down in wheat this fall; and in the spring ensuing the whole of this part will be sown in clover. I have no standing pasture, but use a tract of rented land for grazing; and should be pleased to learn what kind of grass would be most profitable, and prosper best, if sown in the woods for a standing pasture, the undergrowth being first cleared up, the brush cleaned off, and the leaves raked up and hauled away.

The production of my farm in small grain, has been moderately increasing for several years, by its having been a little more nursed than some others. I have for some time been in the habit of top-dressing. I have top-dressed clover one year old with wheat straw, put on in the fall. This plan is well adapted to produce a vigorous growth of clover in the ensuing spring. I have also used ashes on the surface, at the rate of one bushel to thirty feet square, well spread, upon wheat and clover, then covered with litter from the stable; consisting principally of wheat straw, thrown out every morning into a pen, and allowed to go through a fermentation. This I think the best top-dressing I have ever tried.

I have top-dressed land too poor to bring a crop

of any kind, with leaves from the wood, mixed with wheat straw, which I think answers well, if fallowed afterwards for wheat. The most abundant manure we have is that from the farm pen, the top-dressing with which should be done in a careful manner; great regularity should be maintained in spreading it to prevent the tender plants from being stifled: other advantages also will result from this care: the manure will cover a greater surface, and the land will be regularly benefited, whereas, if it is carelessly spread, the crop will be uneven, unseemly to the eye, and much less productive.

I am now trying an experiment in the cultivation of new-ground corn, which I had heard of some time ago, as well as more recently. The land is not cleared of the leaves, trash, sticks, &c., which are not too much in the way of the plough or coulter; and after the operation of the coulter, the ground is hilled up five and a half feet apart one way, and two and a half the other, chopping down the hills low, opening holes at the same time, into which four or five grains of corn in a hill are dropped. The crop is cultivated with coulters first, and then with bar-share ploughs, and should be laid by just before harvest. Once hilling will be sufficient, and that when the corn is about twelve inches high; taking care to chop out the bushes after harvest. A preparation of this kind is exactly calculated to add to the natural fertility of the land, and must, I think, be the best plan to preserve the productiveness of the maiden soil: it saves, besides, the labor of hauling off the litter, unless it is intended, by collecting and burning it, that the first blow in the destruction of the soil should be struck by the hand of the owner, instead of his adding to his land whatever may repay him for his labor in its cultivation.

It is insisted that the next crop after the corn should be tobacco, by which the planter may avoid the labor of hauling off or burning the leaves, and may, at the same time, improve his new land. But upon estimating the profit and loss upon the cultivation of tobacco for a century past, (not half the time from its commencement,) I am disposed to think the planter a loser to no little amount. It is owing, in my opinion, to that crop principally, that the face of our country presents so melancholy an aspect. Take a glance at the states to the north of us, and see if it requires a Solomon to judge the difference of the two countries. There is a grain and grass growing country, and quadruples ours in the product of small grain to the acre: here, to the unsuccessful culture of grain and grass, we add a tobacco crop, the worst of all others to impart any benefit to the soil on which it grows. The labor in cultivating tobacco, can scarcely, at any time, be intermitted longer than three days; and all other crops whatever, except in time of harvest, (and I have seen thousands of plants topped in harvest,) must wait for the tobacco; and after it is made, it frequently remains upon hand for twelve months or longer, because the price it can command, will not more than half repay the cost of the labor bestowed upon it; and when at length it is sold, not one hoghead in a thousand, perhaps, commands ten dollars. The remainder is sold at from three to five dollars per cwt. and during the numerous operations requisite in its cultivation and preparation for market, gulleys are forming and increasing; and the fences

are neglected and abandoned to destruction: whereas, if our lands were cultivated in grain and clover, with other valuable grasses, they would present a very different aspect, with much more valuable returns.

In some instances, however, a farmer might make a small crop of tobacco with advantage. If he owned only a small tract of land, and too many hands to find employment in the cultivation of a crop of small grain, and was unwilling to hire out any part of his negroes, he might, by resorting to a tobacco crop, keep them profitably employed for a few years.

S. B.

ORIGIN AND USE OF TOBACCO.

From the London Penny Magazine.

Tobacco was introduced into Europe from the province of Tabaca in St. Domingo, in 1559, by a Spanish gentleman, named Hernandez de Toledo, who brought a small quantity into Spain and Portugal. From thence, by the means of the French ambassador at Lisbon, Jean Nicot, from whom it derived its name of Nicotia, it found its way to Paris, where it was used in the form of a powder by Catherine de Medici. Tobacco then came under the patronage of the Cardinal Santa Croce, the pope's nuncio, who, returning from his embassy at the Spanish and Portuguese courts, carried the plant to his own country, and thus acquired a fame little inferior to that which, at another period, he had won by piously bringing a portion of the *real* cross from the Holy Land. Both in France and in the Papal States it was at once received with general enthusiasm, in the shape of snuff; but it was some time after the use of tobacco as snuff, that the practice of smoking it commenced. This practice is generally supposed to have been introduced into England by Sir Walter Raleigh; but Camden says, in his 'Elizabeth,' that Sir Francis Drake and his companions, on their return from Virginia 1585, were "the first, as far as he knew, who introduced the Indian plant, called Tabacca or Nicotia, into England, having been taught by the Indians to use it as a remedy against indigestion. And from the time of their return," says he, "it immediately began to grow into very general use, and to bear a high price; a great many persons, some from luxury, and others for their health, being wont to draw in the strong-smelling smoke with insatiable greediness through an earthenware tube, and then to puff it forth again through their nostrils; so that tabacca-taverns, (*tabernæ tabaccanæ*) are now as generally kept in all our towns, as wine-houses or beer-houses." No doubt the tobacco-taverns of Queen Elizabeth's times were not unworthy predecessors of the splendid cigar divans of the present day. It appears from a note in the 'Criminal Trials,' vol. i. p. 361, that in 1600, the French ambassador, in his despatches, represented the Peers, on the trial of the Earls of Essex and Southampton, as smoking tobacco copiously while they deliberated on their verdict. Sir Walter Raleigh, too, was accused of having sat with his pipe at the window of the armoury, while he looked on at the execution of Essex in the Tower. Both these stories are probably untrue, but the mere relation of them by contemporaneous writers shows that they were not then monstrously incredible, and they therefore prove the generality of the practice of

smoking at that time amongst the higher class of society. After a time, however, the practice of smoking tobacco appears to have met with strenuous opposition in high places, both in this country and other parts of Europe. Its principal opponents were the priests, the physicians, and the sovereign princes; by the former its use was declared sinful; and, in 1684, Pope Urban VIII. published a bull, excommunicating all persons found guilty of taking snuff when in church. This bull was renewed in 1690, by Pope Innocent; and, about twenty-nine years afterwards, the Sultan Amurath IV. made smoking a capital offence. For a long time smoking was forbidden in Russia, under pain of having the nose cut off; and in some parts of Switzerland, it was likewise made a subject of public prosecution—the police regulations of the Canton of Berne, in 1661, placing the prohibition of smoking in the list of the Ten Commandments, immediately under that against adultery. Nay, that British Solomon, James I., did not think it beneath the royal dignity to take up his pen upon the subject. He accordingly, in 1603, published his famous 'Counterblaste to Tobacco,' in which the following remarkable passage occurs:—"It is a custom loathesome to the eye, hateful to the nose, harmful to the braine, dangerous to the lungs, and in the black stinking fume thereof nearest resembling the horrible Stygian smoke of the pit that is bottomless." But notwithstanding this regal and priestly wrath, the use of the plant extended itself far and wide; and tobacco is at this moment, perhaps the most general luxury in existence. The allusion to the practice in the following lines, taken from the 'Marrow of Compliment,' written in 1654, seems to show the prevalence of smoking at that period:—

"Much meat doth Gluttony procure
To feed men fat as swine;
But he's a frugal man indeed,
That on a leaf can dine!
He needs no napkin for his hands,
His fingers' ends to wipe,
That hath his kitchen in a box,
His roast meat in a Pipe!"

[Before meeting with the foregoing article, we had marked several passages from old authors on this subject, which will make a suitable addition.

King James in his *Counterblaste* says tobacco "makes a kitchen, also, often in the inward parts of men, soyling and infecting them with an unctious and oily kind of soote, as hath been found in some great tobacco takers, that after their death were opened;" and in his *Witty Apothegms*, after observing that "a tobacco pipe is a lively image of hell," the royal author specifies the things which he most abhorred, by saying that "were I to invite the devil to dinner, he should have three dishes—1st a pig; 2d a pole of ling, and mustard; and 3d a pipe of tobacco for digesture."

Old Burton in his *Anatomy of Melancholy*, says of tobacco—"a good vomit I confesse; a vertuous herbe, if it be well qualified, opportunely taken, and medicinally used; but as it is commonly used by most men, which take it as tinkers do ale, 'tis a plague, a mischief, a violent purger of goods, lands, health; hellish, develish, damned tobacco; the ruin and overthrow of body and soule."—*Anatomy of Melancholy*.

The following account of tobacco is from the Latin-

English Dictionary of Francis Holy-oke. The copy before us was printed in 1659, the last year of the life of Oliver Cromwell; but as it is the seventh edition, it is probable that the whole of this account of "Tobacco" is much older than the book itself, and was probably copied without alteration from the first, through every successive edition of the dictionary.

"*Tabacco herba ab insula Tabaco, &c.* A kind of herbe called Tabacco, it is like henbane, and may be called the Indian henbane, hot and dry in the third degree (as I take it.) The juyce of the greene leafe is good to cure any greene wound, though it be poysoned, the syrup is good for divers diseases, the smoake of the leafe dried and taken in a pipe, is used as in old time Tussilage was, for the cure of the Tissike, the cough of the lungs, distillations of Rheumes, cold, toothach, headach, and in fine whatsoever disease commeth of a cold and moyst cause, and good for all full bodies, that are cold and moyst of constitution, if it be moderately used, and taken upon an empty stomacke, and that it be good Indian, and not sophisticated, Immoderately taken, it dryeth the body, inflameth the blood, burteth [burneth?] the braine and intoxicateth, breedeth wind and crudity, and hath a bewitching facultie that when men use it overmuch they cannot leave it. See Weekerus and others; now of the syrupe of Tabacco they make a vomit."]

From the Library of Useful Knowledge.

AGE OF THE HORSE.

The method of judging the age of a horse is by examining the teeth, which amount to forty when complete; namely, six nippers, or incisors, as they are sometimes called, two tushes, and six grinders on each side, in both jaws. A foal, when first born, has in each jaw the first and second grinders developed; in about a week the two centre nippers make their appearance, and within a month a third grinder. Between the sixth and ninth month the whole of the nippers appear, completing the *colt's mouth*. At the completion of the first year, a fourth grinder appears, and a fifth by the end of the second year. At this period a new process commences, the front or first grinder giving way, which is succeeded by a larger and permanent tooth, and between two years and a half and three years the two middle nippers are displaced, and succeeded by permanent teeth. At three years old the sixth grinder has either made, or is about making its appearance. In the fourth year another pair of nippers and the second pair of grinders are shed; and the corner nippers, toward the end of the fifth year, are succeeded by permanent teeth, when the mouth is considered almost perfect, and the colt or filly becomes a horse or a mare. What is called the *mark* of the teeth by which a judgment of the age of a horse for several years may be formed, consists of a portion of the enamel bending over and forming a little pit in the surface of the nipper, the inside and bottom of which becomes blackened by the food. This soon begins to wear down, and the *mark* becomes shorter and wider, and fainter. By the end of the first year the mark in the two middle teeth is wide and faint, and becomes still wider and fainter till the end of the third year, by which time the centre nippers have been displaced by

the permanent teeth, which are larger than the others, though not yet so high, and the mark is long, narrow, deep, and black. At four years the second pair of permanent nippers will be up, the mark of which will be deep, while that of the first pair will be somewhat fainter, and that of the corner pair nearly effaced. At this age, too, the tushes begin to appear. Between the fourth and fifth year, the corner nippers have been shed, and the new teeth come quite up, showing the long deep irregular mark; the other nippers bearing evident tokens of increasing wearing. At six years the mark on the centre nippers is worn out, but there is still a brown hue in the centre of the tooth. At seven years the mark will be worn from the four centre nippers, and will have completely disappeared at eight years from them all. It may be added, that it is the lower jaw of the horse that is usually examined, and which is here described. The changes of the teeth taking place in both jaws about the same time, but the cavity of the teeth in the upper jaw being somewhat deeper, the mark lasts longer, though the exact period is a matter of controversy. According to what may be considered good authority, however, it may be stated that at nine years the mark will be worn from the middle nippers, from the next pair at ten, and from all the upper nippers at eleven. During all this time the tushes (the extremities of which are at first sharp-pointed and curved) become gradually blunter, shorter, and rounder.

THE CHANGE OF VOLCANIC PRODUCTS TO FERTILE SOIL.

[The slow but certain change of lava and other products of volcanoes to fertile soil, has long been known as a remarkable and general operation of nature. The length of time required for this process is as various as are the proportions of the materials acted on; and even the shortest periods have generally been too long to be recorded by authentic history. The neighborhood of Siena, in Italy, still remains as barren and desolate as if the volcanic covering of the earth was of recent formation: yet it is known that the eruption that produced it took place more than three thousand years ago. To this, a remarkable contrast is presented in the following account of the island of Ascension, on which, the fertilizing effects of natural causes have rapidly worked to convert a naked and desolate rock, to a fertile habitation for man.]

From Morrell's Voyages.

The island of Ascension was formerly described as "a barren uninhabited island in the South Atlantic Ocean, without soil or vegetation," and as "an impracticable heap of volcanic ashes." This description was once correct; but industry, skill, and perseverance have now rendered a more favorable one appropriate. The island is in fact a shattered volcano, the pulverized materials of which, are rapidly becoming converted into a rich and fertile soil. It formerly belonged to the Portuguese, who discovered it in 1501; but in 1816, some English families from the island of St. Helena settled here, and it was taken possession of by the British government as a military station; and sixty transport ships provided the garrison of two hundred men with supplies from the Cape of

Good Hope. A fort was erected, roads constructed, gardens planted, houses built, &c.

This island is of triangular shape, about twenty miles in circumference; being eight miles from north to south, and five miles and a half from east to west. It may be seen from the mast-head in clear weather at the distance of ten leagues, its appearance is uneven and rugged, being an assemblage of hills, with a mountain overlooking them from the south. This is called Green Mountain, and is about eight hundred yards in height. The best anchorage at this island is in Turtle Cove, in eight or ten fathoms of water, with the flag-staff on Cross-Hill bearing south-east-half-east; Rat Corner, south-south-west. Distance from the nearest shore about one mile. A heavy surf often interrupts the landing for several days together.

The whole island is of volcanic origin, and the surface is now partly covered with a reddish soil, while in some places there is a yellow earth resembling ochre. A fine black earth covers the bottom of the valleys, which are now in a fine state of cultivation by the little military colony before alluded to. The island is composed of several conic hills, from two hundred and fifty to three hundred and fifty yards in height. Green Mountain has a double top, rising in two peaks, like the Grecian Parnassus. In almost every part of the island, as Mr. Purdy justly observes, are found prodigious quantities of rocks full of holes like a honey-comb; together with calcined stones, very light, and pumice-stones. "The rocks, lying upon each other in a very irregular way, and mostly on the declivity of hills, leave great chasms between them; and as they have very little solidity, an observer runs some risk who ventures without caution upon them." About the middle of the island, and between the hills, there are several little plains, which are divided into small spaces, so remarkably distributed that you would take them for so many pieces of land cleared of stones, and separated from each other by long walls.

According to the statement of the officers of the English brig *Slaney*, who visited this island in February, 1827, Ascension was then (under the government of Lieutenant Colonel Nicholls) in a most flourishing state of progressive improvement as to its resources, both natural and artificial. Roads are constructing from the several springs (sixteen in number) to convey water to the garrison; and hopes were entertained of being able to supply a squadron with that essential article in the course of a year, by means of iron pipes from the principal spring to a reservoir near the beach. Pasturage for cattle is making its appearance. Sheep, turkeys, guinea-fowls, and live-stock of every description thrive well. Fruit, such as pines, Indian gooseberries and plantains have been successfully cultivated. Potatoes, onions, carrots, pease, French beans, and almost every esculent vegetable have been produced upon the island; and thus from a desert cinder, nature has been courted successfully to yield most of her useful vegetable productions. Only two deaths from sickness have occurred at Ascension during the last two years (1825 and 1826;) and when we consider that gales of wind are unknown to have visited the anchorage there, the value of the island as a rendezvous and a depot for stores and provisions, for a squadron of observation, destined to

cruise either on the African or Brazilian coast hereafter, will obviously repay the liberal attention that has been bestowed upon it."

A short time after the visit of the brig *Slaney*, the *William Harris*, a transport, landed at the island a cargo of live-stock, horses, hares, rabbits, pheasants, poultry, partridges, &c., seeds of vegetables, agricultural implements, and a supply of necessaries for the garrison, who all enjoyed very good health. In return, she took a large quantity of fine turtle, with which the island abounds; and according to Capt. Leslie, it furnishes the finest in creation," being "not only fat and large, but in the highest perfection for eating. Their weight, in general, is from one to seven hundred pounds. They are of all I ever tasted, the fattest and the finest; all others I ever saw before bear no comparison with them."

FLOATING GARDENS OF CASHMERE.

From the London Penny Magazine.

The city of Cashmere, being the capital of the province of that name in Asia, is situated in the midst of numerous lakes, connected with each other, and with the River Vedusta, by canals, separated by narrow lines and insulated plots of ground. Upon these lakes are floating gardens, cut off generally from the body of the lake by a belt of reeds; the cultivation of which is not only very singular, but highly profitable, and worthy of imitation in many parts of Europe as a resource for raising food for man. The second number of the 'Journal of the Geographical Society' contains a notice of the Natural Productions and Agriculture of Cashmere, from which the following account is compiled:—

The city of Cashmere is subject to considerable inundations, which have become annually more frequent, through the neglect of the government in not checking the accumulation of weeds and mud, which diminish the depth, and consequently increase the surface of the lakes. This has suggested the expediency of a floating support by which vegetables are cultivated in safety, deriving as much moisture as is beneficial without the risk of being destroyed. Various aquatic plants spring from the bottom of the lakes, as water lilies, sedges, reeds, &c.; and as the boats which traverse those waters take generally the shortest lines they can pursue to their destination, the lakes are in some parts cut into avenues as it were, separated by beds of sedges and reeds. Here the farmer establishes his cucumber and melon floats, by cutting off the roots of the aquatic plants about two feet under water, so that they completely lose all connection with the bottom of the lake, but retain their situation in respect to each other. When thus detached from the soil, they are pressed into somewhat closer contact, and formed into long beds of about two yards breadth. The heads of the sedges, reeds, and other plants of the float, are next cut off and laid upon its surface, and covered with a thin coat of mud, which, at first interrupted in its descent, gradually sink into the mass of matted stalks. The bed floats, but is kept in its place by a stake of willow driven through it at each end, which admits of its rising and falling in accommodation to the rise and fall of the water. By means of a long pole thrust

among the reeds at the bottom of the lake from the side of a boat, and turned round several times, a quantity of plants are torn off from the bottom, and carried in the boat to the platform, where the weeds are twisted into conical mounds about two feet in diameter at their base, and of the same height, terminating at the top in a hollow, which is filled with fresh soft mud, and sometimes wood ashes. The farmer has in preparation a number of cucumber and melon plants, raised under mats, and of these, when they have four leaves, he places three plants in the basin of every cone or mound, of which a double row runs along the edge of every bed at about two feet distance from each other. No further care is necessary except that of collecting the fruit, and the expense of preparing the platforms and cones is very trifling. Mr. Moorcroft traversed about fifty acres of these floating gardens of growing cucumbers and melons, and saw not above half a dozen unhealthy plants; and he says, he never saw in the cucumber and melon grounds, in the vicinity of populous cities in Europe or in Asia, so large an expanse of plant in a state of equal health or luxuriance of growth. The general depth of the floating beds is about two feet, and some of them are seven feet broad. The season lasts for three months and a half, beginning in June. From the first setting of the fruit to the time of pulling, seven or eight days are the ordinary period. Thirty full-sized fruit from each plant, or from ninety to a hundred from each cone, are the average crops. The seed of the melon is brought annually from Baltistan, and the first year yields fruit of from four to ten pounds each in weight; but if the seed be re-sown, the produce of the second year exceeds not from two to three pounds. Unless when eaten to great excess, the melon produces no disorders, and it is remarked that healthy people who live upon this fruit during the season, become very speedily fat; and the effect upon horses fed upon this fruit is reported to be the same. In the early part of the season, cucumbers of full size sell at the rate of about three for a piece of coin of the value of a halfpenny; but as the weather becomes hotter, and the plants get into full bearing, ten, fifteen, and even twenty are purchased for this price. It is calculated that every cone yields a money return of about eighteen-pence. Allowing six-pence for labour of every description, and including also the tax, the clear profit is a shilling for every two square yards. The yield of the melon is numerically less, but the return of profit is at least equal. No other vegetables are raised upon the spaces between the cones, although Mr. Moorcroft thinks that onions, cresses, and other useful vegetables might be raised upon them; and water-mint grows spontaneously upon the floats.

Cashmere, or Cassimere, is one of the northern provinces of India within the Ganges. It is surrounded by mountains, and from its beauty and fertility has been called the Paradise of the Indies. It contains upwards of 100,000 villages, is well stocked with cattle and game, and is said to be unmolested by beasts of prey. The people are ingenious, and resemble the Europeans in their persons, and the women are fair and tall. The famous Cashmere shawls derive their name from this country, though at present the supply that actually comes from it is comparatively small.

FARMING IN THE VALLEY OF VIRGINIA.

Report of the Trustees of the Agricultural Society of the Valley, for 1825.

From the Records of the Agr. Soc. of the Valley.

The Trustees of the Agricultural Society of the Valley, who were appointed a committee to view the farms offered, and award the premium "to him whom they supposed to be the best manager of a farm, and most deserving of reward—taking into consideration the force employed, the crops made, his rotation, his method of improving the land," &c. &c., respectfully report:

That in the month of June last, Mr. Robert Page, of the county of Frederick, announced himself as a competitor, and desired them "to view his farm and decide upon his claims." For this purpose they assembled at his house, with a determination to inspect minutely all that came properly under the object of their visit, that they thereby might be enabled to expose mismanagement, where it existed, and to render more conspicuous the proof of good husbandry and domestic economy, where they were visible. To perform their arduous duties, and to award justly the premium entrusted to their care, the committee was sensible required they should divest themselves of all "fear, favor, or affection." And they now confidently assert, that this they accomplished, and that their report is based upon their impartial and unbiassed judgment. It affords the committee peculiar pleasure to state, that in their opinion the competitors for the very desirable premium offered by the society, are governed by the most honorable and commendable feelings—a spirit of emulation so much wanting with farmers—a praiseworthy desire to excel in the noblest occupation. This their whole course, thus far, has manifested to the entire satisfaction of the committee.

In viewing Mr. Page's farm, your committee was firstled to his corn-field, containing five and twenty acres, which they found in a beautiful state—exhibiting proofs of industry and attention which met their decided approbation. They next came to his crop of wheat; (then nearly fit for the sickle,) which they found such as would be called a safe and profitable one, that would in all probability yield from fifteen to twenty bushels per acre. It is but proper to notice that the committee were particularly struck with the clean state of this crop, the result of fine seed and a proper preparation of the ground. The committee passed from the cultivated to that part of Mr. Page's farm which is this year in grass. Around this part of his tract they found the fencing in bad order, and in the fields some symptoms of bad management, which the rest of his farm was unusually exempt from. They allude to the *sprouts* of various descriptions, and the *loose* stone, that occupied space they would rather have seen appropriated exclusively to grass.

Mr. Page's buildings, of every description, are neat and comfortable; his arrangements for the accommodation of his negroes, his stock, &c. are worthy of the highest commendation. The committee would have been pleased could they have presented to the society a statement of the force employed, the crops raised, the stock supported, &c. on Mr. Page's farm. The circumstance of his uniting the labor and product of several farms,

will prevent him from gratifying the expressed wishes of the committee on that point.

In the month of August your committee were called upon to view the farm of Henry S. Turner, of Jefferson county, who then announced himself a competitor for the premium above mentioned. Of his management, the committee will be able to give a much fuller report, from the circumstance of his having presented to them a statement (certified as the rules of the society require,) of his whole system of farming. They would not be doing justice to Mr. Turner's very able and satisfactory memoir, did they attempt to change its phraseology, or fail to embody it in their report; they therefore present it to the society *verbatim*, with the fullest impression, that as it is a practical production, it will prove to the farmer one of high and lasting value.

Mr. Turner says, "Wheatland Farm contains almost 940 acres of land, all inclosed: 300 in wood. A portion of the arable land is divided and laid off into six fields of 90 acres each, which yield a regular rotation of crops in the following succession, to wit: wheat, corn, fallow, wheat, clover, fallow, or, corn, fallow, wheat, clover, fallow, wheat. It will thus appear that two of these fields are in wheat, and one in corn annually: consequently a moiety of the tillable land yields a grain crop each year, though no part is in corn oftener than once in six years, nor in wheat oftener than once in three years, and all the fields are in clover, in succession, two years and six months, it being my habit to sow clover in the month of February, (on a snow,) and never to break up fallow until August, when the field which had produced corn the previous year, and another (a clover field,) are ploughed to the average depth of seven or eight inches, with four barshare ploughs, three horses or mules in each—the quantity daily ploughed from six to seven acres, according to the state and condition of the ground. After the ploughing has been completed, these fields are harrowed in the direction of the furrow, with heavy square harrows, drawn by three horses or mules, then laid off crosswise, in lands of 18 feet, and sowed the first of October at the rate of from seven to eight pecks per acre, and carefully harrowed in, which is performed in seven or eight days with four harrows. It is of the greatest importance, and demands the most particular attention of the farmer to commit his seed to the earth at the *proper time*. Placed, as it were, between Scylla and Charybdis, he has to steer a skilful and a narrow course to avoid the dangers that await him; a few days too early, and his hopes are wrecked upon the ravages of the Hessian fly; a few days too late, and they are destroyed by the desolating influence of the winter frost. Experience and much observation has assured me that the beginning of October is the *proper time*; but to defer seeding thus late with safety, our land must possess great strength and vigor. I omit, therefore, no means of fertilizing it to the greatest possible degree, as I am well assured that there is no labor performed by the farmer so amply remunerated as that employed in the application of manure.

"My calculation is always on twenty bushels of wheat to the acre. This expectation is rarely disappointed—it more frequently happens that there is an excess; better cultivation would insure increased product. I am convinced our lands are

capable of yielding 30 bushels on an average. In the year 1819, I gathered from 55 acres 1743 bushels; from 90 acres 2400 bushels; and from 40 acres 680 bushels—the first and second being of the blue stem wheat, (the most prolific kind that I am acquainted with,) and the last Lawler, (or Snyder,) which, though less liable to the attacks of the Hessian fly than most other species, is by no means exempt, and is less productive than the blue stem by 20 or 25 per cent.

"About 1500 bushels of wheat is secured within two barracks, near my barn and stables, (each 60 by 20 feet,) for the purpose of furnishing provender and litter to the stock stationed here during winter; the remainder of the crop is stacked near the centre of the field intended for corn the ensuing year; and here are erected shelters and pens, where the farm stock are fed and profusely littered, during winter, in temporary ricks, and with alternate layers of wheat-straw and corn-stalks, with the blades, shucks and tops attached, for the purpose of providing an ample fund of manure, to be hauled out on the same field early in the spring.

"I deem it the most economical method to plough under the manure in a rough state, and let the process of decomposition go forward under the tegument laid over it by the plough, as by this means the very serious waste by evaporation is obviated, the corn crop is measurably benefited, and it is in a state of preparation to impart the highest degree of nutriment to the succeeding crops of wheat and clover.

"My corn field receives the same preliminary cultivation as do my wheat fields; it is then laid off and planted four feet each way; (by close planting say three or three and a half feet each way, in *strong land*, I am confident [the product] would be increased, as the number of plants would be astonishingly multiplied; but the use of the plough would be more difficult, and no price which the article usually commands in this region of country, would justify the expense of its cultivation with the hoe.)

When about six inches high, it is harrowed with heavy harrows, the middle teeth being removed; the harrows are followed by hands provided with small light rakes, with four iron teeth, to uncover the corn and thin it, leaving two stalks in each intersection, after which it is ploughed over three times with the *double shovel*, and laid by at the commencement of harvest. This is an admirable instrument for cultivating corn; it operates superficially, so as not to disturb the manure turned under by the barshare plough, and will perform two-fifths within a given time more than the single shovel, with, I believe, no augmentation of labour—at all events, one mule is fully adequate to the task.

"I do not estimate my average crops of corn at above 30 to 35 bushels per acre, though in the year 1823 I made 50 bushels per acre on 90 acres. The season was propitious, and this corn was planted four feet by three, two stalks in the hill.

"My force consists of eight ordinary men, two fine active boys, one old man in the decline of life, and a blacksmith and a carpenter occasionally; twelve horses and mules, with the incidental increase of brood mares, and four yoke of powerful, well trained oxen. And here let me take occasion to testify in favor of this most frugal, useful and estimable beast, the ox, and to express the earnest and anxious hope that he may speedily be

brought into more general use among us, and elevated in the estimation of farmers to the rank which *his* merit and *their* interest so justly entitle him to. With the exception of ploughing, harrowing and thrashing, the entire labor of my farm is performed by oxen; the magnitude of their service, and the various ways in which they are most useful, is incalculable, and incredible to those who unfortunately have no experience of them. They are generally *fat*, never *poor*, and are never grain fed, except during the most inclement weather in winter, when laborious service is exacted of them, and even then they require *nothing* better than a scanty allowance of the offal of the granaries. One important result of this is, (among many other advantages,) that my work horses are at rest nearly half the year, by means of which, the expense of feeding them is considerably curtailed, and their lives prolonged. But it is in the particular of hauling out manure in the spring season, (when the horse and mule teams are employed in breaking up the corn field,) and hauling stone for fencing at all seasons, that the instrumentality of the ox is most conspicuously valuable; and much of the same service may be done likewise in the fall. Previous to the adoption of the extended use of oxen on my farm, I was constrained to rely almost exclusively on plaster of Paris for improving the soil. I used it to the amount of twelve or fifteen tons a year, and bought it during the war even at the cost of 40 dollars per ton; its effects were sometimes truly miraculous, but at other times not visible at all. All this is now superseded, and for the last five years I have entirely omitted the use of plaster, as by means of my ox teams I am enabled to get out, in good time, in the spring, the manure which has accumulated during the winter. Let me, however, not be understood as recommending the disuse of plaster—this is far from my intention: I have had ample proof of its unquestionable efficacy, and as auxiliary to stable or barn-yard manure, appreciate it most highly. Last spring, with eight oxen and three men, I manured, highly, 120 acres, passing over the richer spots, and applying the manure only where it was wanted—the number of acres actually covered with manure, I estimate at not less than 80; an inconsiderable part consisted of unrotted straw. But upon the ox (valuable and important as his services certainly are to the concerns of agriculture,) panegyric must not be exhausted: of all animals subservient to agricultural labor, the mule stands preeminent. I have no terms adequate to bespeak his merit—none that could be employed, could exaggerate it; he is a long liver, a small consumer, a powerful, faithful, and enduring laborer. I speak with the confidence of more than thirty years experience of the relative qualities and capacities of the mule and the horse, when I pronounce the superiority of the former to the latter in *every* respect, and for *every* purpose, connected with the operations of husbandry. It is a great misfortune, and much to be lamented, that prejudices, absurd as they are unfounded, and greatly detrimental to the farming interest, should still be fostered against this much abused and despised, though most valuable animal, by thousands ignorant of his history and usefulness, in despite of the testimony of those who have tried and know him well.

"The number of mules I have at present on

my farm is 12, of different ages; this number I mean to increase to 16, when the horse will be banished, except for the saddle and riding carriages, and even in this exception, a concession is made by judgment in favor of fashion. Some of those I now have, have been 16 or 17 years, upon the farm, and I now value them at \$200 each. With such impressions, I trust it will not be deemed impertinent that I avail myself of this occasion to recommend most earnestly to the society, to extend their sanction and patronage to the more general introduction of the mule, by suitable premiums, or such other provisions as their wisdom may approve; being convinced that there is no object more in accordance with the interest of agriculture and the furtherance of their patriotic design.

"I should have mentioned in the foregoing part of this brief and hasty memoir, that it is my custom to cut and stack in the fields as much of my corn as I am able to haul into the farm-pens during winter; by this means the mass of manure is greatly increased, and its quality improved, the stalk acting as an *absorbent* to arrest the fertilizing fluids which would otherwise in a great measure escape. The whole of my corn is shucked in the field on the stalk; besides other obvious advantages, by this method, there is an important saving in time—my corn is generally housed by the middle of November.

"Exclusive of the six fields above spoken of, I have another containing 70 acres, (a late purchase.) This has rested some years in clover, to resuscitate from the exhausted state in which I received it. It will now be equally divided, and each half alternately cultivated, two years in succession, in wheat and clover.

"I never employ hired labor for any purpose in aid of my farming operations, and with six cradles generally complete my harvest in twelve or fourteen days.

"The foregoing outline is deemed sufficient for the present purpose; should a more minute and comprehensive detail be thought interesting, I beg leave to refer to vol. 2, page 400, of the *American Farmer*. Some allowance, however, will be here claimed for typographical errors, and other seeming inconsistencies, all of which are susceptible of satisfactory explanation."

It may readily be supposed, that from the fact of the committee having heard much of Mr. Turner's extraordinary management, they were prepared to see much, and that if their expectations were in the smallest degree disappointed, they should not fail to express it to the society. Appearing at Wheatland with these feelings, they were not prepared to notice or give credit for little proofs of good management only, but sought for and required more prominent ones. They now feel it a duty to state, that their highest anticipations were most satisfactorily and fully realized, and that they were not able to discover a *solitary exposure* of mismanagement; on the other hand, *on every part of his estate*, the most forcible and convincing exhibitions were given of a well selected rotation, and of the most indefatigable and devoted attention to business.

Some members of the committee believing that additional information to that given in his "Memoir," could be furnished by Mr. Turner, proposed that he should be required to answer questions

which they were prepared to propound to him, which he readily consented to do. They are presented, with their answers, to the society, in the simple garb and laconic form they first appeared; in that shape they will be more acceptable to farmers. They follow in order:

Quest. 1st. What quantity of stone-fencing have you on your farm; and was it all built by your own hands?

Ans. I have a few roods less than 700. When I commenced, I employed a man to work with my blacks, who aided in building a few roods.

Quest. 2d. Do you ever vary your quantity of seed wheat, per acre, with the different qualities of the soil?

Ans. My practice is not to vary the quantity of seed, in consequence of the difference of my soil not being considerable; but were I to vary, I should put a less quantity on thin land.

Quest. 3rd. Have you of late years increased your quantity of seed?

Ans. I have, since my lands have improved; having put formerly one bushel, whereas I now sow from seven to eight pecks. I am of opinion that thick sowing is preferable to thin.

Quest. 4th. What is your experience on the subject of seeding wheat as to the depth of deposit?

Ans. I consider the depth of deposit above four inches dangerous; if the ground is well prepared, the bare covering of the earth is sufficient.

Quest. 5th. Do you think it desirable that the ground should be much pulverized for the reception of seed wheat?

Ans. I should be apprehensive of its baking were the earth made too fine; clods of small size would be preferable.

Quest. 6th. When you first took possession of your farm, what was the average crop of wheat and corn per acre?

Ans. In 1804, when I first took possession, my average crop of wheat was about twelve bushels per acre; and of corn, five barrels in a good season would have been considered a great average.

Quest. 7th. Was the improvement which has been made in your farm produced by the expenditure of any other resources than those derived from the production of the farm?

Ans. By none other.

It will appear, upon reference to question the first, alone, that on Mr. Turner's farm there is nearly 700 roods of stone-fence. The remainder of his fencing is made in the neatest manner of locust stakes and rails. On the whole farm your committee were not able to find a *panel* that would not be considered good. They were particularly struck with the number of *fine gates*, (twenty-one,) admitting ingress and egress, (generally in a direct manner,) with every field. Mr. Turner's barn is a valuable one—his barn-yard judiciously laid off—his stables are roomy and comfortable—his arrangements for the preservation of his grain after it is thrashed and cleaned—his horse-feed when ground, implements of husbandry, &c. are such as afford strong evidences of good management, and offer to every farmer valuable hints.

On the 24th of this month, Mr. Bushrod Taylor, of Frederick, who had previously announced himself as a competitor, accompanied the committee over his farm, and afforded them every facility

in his power to investigate, minutely, his claim. Your committee had got but an imperfect view of Mr. Taylor's farm, before they discovered sufficient assurances that they were where a system of management existed. In approaching Mr. Taylor's house you pass through the centre of his farm, and leave three square fields on the right, the same number on the left, presenting that gentle undulation so desirable in a Virginia farm, where the lands are liable to baking. Around these fields there is the most uniformly good fencing that your committee have ever seen in Frederick, and at the corner of each an admirable and lasting gate. His fences are made of substantial locust posts, well pinned together at top, and placed alternately fifteen inches from a strait line, so as to form, when it is completed, a worm of double that distance, (2 1-2 feet.) The rails are laid upon a stone foundation, and in every respect the fencing is such as particularly pleased the committee. When your committee state that Mr. Taylor's farm is laid off in the northern style, they hope they will be considered as saying much in its favor. His plan of dividing a farm of 165 acres of cleared land into three lots of 10 acres, and six fields of 22 1-2 acres each, they highly approve of; because they believe with our soil, and in our country, a few fields only on a farm are totally inconsistent with an improving rotation.

Considering Mr. Turner justly entitled to the premium—because "his crops, allowing for the difference of force employed," are at least as good, "his method of improving the land" and "his rotation" better, and other manifestations given of his being a "better manager of a farm," and "more deserving of reward"—your committee do with much pleasure award it to him. They deem it not impertinent to ask of Mr. Turner that hereafter he should not conceal his "lights under a bushel," but that he should endeavor to do good by precept as well as example. To Mr. Taylor they would say, "go on, do well, and thrive;" and to the society, that they regret they had not placed under their control another premium. The most pleasant part of their duty is to reward merit where they discover it.

The trustees have, to the best of their abilities, performed the duties of their laborious and unthankful office, without the hope or the wish of any other reward than the promotion of the public good. Under these assurances they doubt not their decision will meet the approbation of high-minded and generous competitors.

By order of the members,

WM. M. BARTON,
President of the Board.

A. S. TIDBALL, Sec'y.

AN APOLOGY FOR "BOOK FARMERS."

To the Editor of the Farmers' Register.

I believe it is a rule of evidence in our courts of law, that general concurrent opinion, expressed by long existing and public report, is good testimony to fix the good or bad character of any individual. We cannot expect the public to be more strict in scrutinizing and rejecting evidence than are our judges; and by the testimony of common report, and general opinion, "book farmers" are already condemned to take their place among the class of

bad farmers—and placed even in a lower rank than the greater number of that numerous body. There has been truly so much justice in this decision, in the greater number of cases, that it is difficult to establish any exceptions—and almost as difficult to obtain an admission that there can be any valuable instruction in the writings of those who have been confessedly unsuccessful as practical farmers. It is not only that this low estimate of farmers who write, or who are even addicted to reading on agriculture, is made by those who do neither, but we may find in the expressions of writers themselves, that they concurred in this opinion, as to their fellows. In this manner, the most distinguished names have been treated. Those men who undoubtedly have rendered the most important services to agricultural science or art, were probably, without exception, ridiculed by their neighbors for their practical operations—and have been indebted to strangers for all the reputation they may have acquired. But without regarding merely verbal, and, therefore, evanescent censure, I will offer a few proofs of how "writing farmers" have stood with each other. Lord Kames, to whom Scottish agriculture owes so much, is the subject of sundry standing jests in print, all of which go to show him very much wanting in practical knowledge, as a farmer. Marshall, who has written so many volumes on agriculture, and who is quoted with so much respect, is spoken of in the *Edinburgh Farmer's Magazine*, with contempt. Arthur Young, the most distinguished, as well as the most voluminous writer on agriculture, the one who stands perhaps the highest among its zealous and effective friends, is thus addressed by the reviewer of his *Agricultural Survey of Lincolnshire*: "If we turn our observations to Bradfield farm, in Suffolk, the seat of your improvements, the most useful lesson of practical husbandry may be instantly learnt, by adopting the contrary of your example. Were the practical husbandmen of Suffolk, within the circle of your fame, questioned by an inquisitive traveller, respecting who was the worse farmer in the county, they would immediately answer *Arthur Young*." Young himself speaks of the celebrated Rozier, whom he visited during his travels in France, in such manner as to show that he considered him utterly ignorant of the subject on which he had written so much. Davy's chemical facts, in his work on agricultural chemistry, could not be attacked—but his deductions from them have been often made light of, with sundry sneering allusions to his being unacquainted with practical farming. In our own country, Judge Peters has been held up as a wretched farmer in *Lorain's Husbandry*—the author of which, in his turn, may meet with equal censure from some other quarter, if he has not already paid that penalty. Others of our countrymen who have written on agriculture, though perhaps not yet denounced in print, have equally earned their common reward in the public estimation.

This state of things is indeed strange. It will not be denied on the one hand, that there is much of exaggeration in these censures: but on the other, it must be confessed, that there must be some solid foundation for such generally prevailing opinions. I do not undertake to defend the practical operations of writers on agriculture—neither on account of their imperfections, do I deny

their theories, or their written instructions: and it will be the object of these remarks to show that there are causes for their practice being generally unprofitable, even when their theoretical opinions, and instructions for practice, may be both sound and valuable.

To enable a man to make discoveries or improvements of value, in any art or business of a civilized people, it is requisite that he should be directed to such investigations by natural genius, by education, and early habits; and also by a degree of enthusiasm and ardor for a favorite object, which causes it to be the sole object of pursuit, to the neglect of others perhaps of equal importance. Fortunately for the success of such projectors of improvements, most of the arts, and our complicated employments, have been divided into as many separate departments as the proper *division of labor* requires, and each man may find employment for his intellectual, as well as physical powers, in the particular pursuit in which he feels most interested, without being distracted by any other engagements. When Arkwright (for example) had, after the study of years, conceived his plan for spinning cotton by machinery, which has, by its success, revolutionized the manufactures and commerce of the world, he had only to bring his directing mind to bear on workmen and materials of every, and the most perfect kind, to have his schemes reduced to practice. He had only to give general directions, to state what he wanted, and whatever could be made with wood and metal, in the hands of the most skilful workmen, was soon ready for his service. But if Arkwright had not had such mechanical aids—had he been compelled to superintend and to direct every particular operation, even from the cutting of his timber, and melting his metallic materials—and at last to be himself the cotton manufacturer, and the controller of its numerous laborers—there can be but little doubt that this great discovery would have completely failed. Arkwright would either never been known except as the dreamy and indolent barber, whose schemes were considered (even by his own wife) as leading to starvation instead of riches—or would have become bankrupt as a manufacturer, because less capable of managing men and women, than to contrive, or even to construct the most complicated mechanism. It is unnecessary to cite other individual examples. The fact is notorious that most of the men to whom the world has been most indebted for valuable improvements, have been such poor economists and managers of their business in general, as to have lived and died poor. But we do not think the less of the value of the thrashing machine, the cotton saw-gin, and the steam boat, because Meikle, and Whitney, and Fulton, obtained almost nothing from the sources of wealth which their several inventions offered to themselves, as well as to the world.

If a man has capital, prudence, energy, and general intelligence, he may succeed in many branches of business of great extent and complication, though possessing but little knowledge of any particular process—because he can call to his service talents of every kind desired, all made perfect in their separate and limited departments. But not so in farming. In this business (particularly in this country) there has been almost no division of intellectual labor—and the farmer must

understand every operation, and superintend and direct every laborer, or his interest will surely suffer. There is more natural and peculiar talent required to manage a large farming business, than to command an army, or to be a passable minister of state—and there are fewer of the former, than there are men who are even renowned as warriors or statesmen. The more ignorant the laborers are, and the more imperfect the materials of every kind, so much the more of varied and extended talents are required in the directing mind: and, therefore, it is much easier to be a successful farmer in England than in Virginia. If Mr. Coke, who has acquired and deserved so much fame for the excellent management of his Norfolk estate, could be placed in lower Virginia, to direct as large a business through overseers and negroes, he could not by the apprenticeship of a long life, learn to make any clear profit. His general plans might be supposed to be faultless, and nothing wanting to carry them into effect that capital and judicious general arrangements could supply: still every thing would fail, more or less, in execution, because it would be impossible that Mr. Coke could know how to provide for the most minute requisites, and also see that every thing, however trivial, was executed. He would be, in fact, placed in the situation of a merchant, who before being able to build and employ a ship, would have to direct the preparation and use of every material, and then the mode of navigating the vessel—every order being supposed to be executed by ignorant and unwilling agents.

It is for these reasons that farmers who are sufficiently zealous in pursuit of some object, to write for the instruction of others, are seldom qualified to attend well to all the details which a farmer's business requires: and even were it otherwise, the habit of writing would probably withdraw from business that continual superintendence, and unbroken occupation of the mind, which is essential to good management in business of every kind. The enthusiastic schemer, devoted to one object, whether he succeeds or fails in that pursuit, will very surely not succeed in general management.

If, then, it were admitted that every writer on agriculture was really as bad a farmer as has been charged by the spirit of ridicule, or by malice, it would by no means follow, that their instructions might not be highly valuable, even to such as were much better farmers (in practice) than the writers themselves. From each one, perhaps, something of value may be gained, though he may be deficient in most, or in all other respects.

But it is not only the writers, but the readers of books on agriculture that fall under popular ridicule, and every marked deficiency exhibited on the lands of any "book farmer," is attributed to his applying to books for instruction. It will be found, however, upon investigation, that such bad management is almost always in violation of written instructions, instead of being in accordance with them. It is true, that we may find in books plenty of erroneous doctrines, and of true doctrines totally unsuited to our circumstances; and that sometimes, we err by following such wrong guidance: but errors of practice like these, are rare, and may easily be avoided by a discriminating judgment.

With these views, I do not consider it necessary

that agricultural books should be perfect, to render them valuable and instructive—and that the practice of a farmer should be good throughout, to make his example valuable in some, or perhaps many respects. I therefore readily accord the highest degree of merit to John Taylor, as an improving farmer, and a benefactor to our country, although it is said that his plough-gear, and implements were of the lowest order—to eulogize the efforts, and highly prize the success of R. K. Meade in improving the live stock of Virginia, without enquiring into the profits of his tillage—and (if you will permit such an illustration) Mr. Editor, I am content to profit by your opinions on calcareous manures, and your successful practical use of them, without testing them by your general management as a farmer, which I have heard is very far from being commendable.

But I have conceded too much to our adversaries, by discussing this question on their own premises. I deny that reading ever made any man a worse farmer. Books, and agricultural books, may serve to occupy the leisure of many an indolent farmer—but in that case the occupation is not the cause, but the effect of negligent habits, and serve to lessen instead of increasing its ill effects. Of those who thus neglect their business, there are hundreds who change their pursuits to pleasure or vice, while one does to study. It would also seem, from prevalent opinions and sarcasms, as if no reading farmers were successful in practice. So far from this being the case, there are few of the best farmers in Virginia, who have not been diligent and extensive readers of agricultural works, and who do not owe much of their success to the general information thence acquired. I might name many striking examples—men who are known by reputation throughout Virginia, as judicious and successful practical farmers—of whose claim to this distinction there would be no question, and who stand so high in this respect, that they are altogether unsuspected of the sin of reading agricultural books.

If any of our despisers of theoretical and book farming, were asked by a foreigner “who are the best and most successful practical farmers in Virginia?” the answer would most certainly include the names of several persons whom I know to be among the most extensive readers of agricultural books in general, and who would not hesitate to acknowledge their great obligations to these sources of instruction. Indeed, but for the general and strong prejudices on this subject, it would seem as idle and as ridiculous to adduce arguments to support my position, as to prove the general proposition that the pursuit of knowledge is aided by instruction.

I will readily admit that a habit of reading works on agriculture, does not always help to make a good farmer, any more than a habit of hearing sermons always makes a good christian: but that admission does not include, what is generally claimed, that reading is injurious to working men. I will illustrate my view, by repeating a story which I have heard brought up for the purpose of condemning and ridiculing reading farmers. In one of the counties adjoining the Blue Ridge, some twelve years ago, there were two adjacent farms, very similar in every respect, except for their condition and management; the one exhibiting every mark of care, industry, and econo-

my, while the want of these, and dilapidation and waste of every kind, were as conspicuous on the other. A traveller who passed by the latter farm, on his way to visit the owner of the former, was forcibly impressed with the apparent contrast, and asked his host to explain the cause. “The reason is plain enough,” was the answer; “while my neighbor is in the house reading the American Farmer, I am ploughing.” But the fault in this case was the indolence or carelessness of the farmer, and not in the particular amusement or study for which his work was neglected. If he had spent the same time in gaming, drinking, hunting, or paying visits to other idlers, his farming would not have been better. Nothing will compensate for the want of industry and economy: but the farmer who possesses these indispensable qualifications, will always be greatly benefited by intellectual improvement, and by the most extensive acquaintance with the opinions of the best farmers throughout the world: and these opinions are only to be found in books.

After offering these observations, it will not require the signature to show that I am one of those who bear the reproach of being

A BOOK FARMER.

STEAM CARRIAGES ON THE LIVERPOOL RAILWAY.

Extract from Dr. Lardner's Lectures on the Steam Engine.

Some time before it was opened a contest took place on this railway between three different steam coaches. The Rocket, constructed by Mr. Stevenson; the Sanspareil, by Mr. Hackworth; and the Novelty, by Messrs. Braithwait and Ericson, for a prize of £500, offered by the directors to that which should accomplish the greatest distance in the shortest time. On this occasion the Rocket, which gained the prize, went over the space of 30 miles in 2 hours 6 minutes and 49 seconds, being at the average rate of 14 1-5 miles per hour. But in the course of the journey it sometimes proceeded at the rate of above 29 miles an hour, and its slowest motion was about 11 1-2 miles in that time.* In May last, Dr. Lardner saw the engine called the Victory draw on the same rail road the weight of 92 tons 19 cwt. 1 quarter, in twenty wagons, together with its tender containing fuel and water, from Liverpool to Manchester, a distance of 30 miles, in 1 hour 34 minutes and 45 seconds, besides 10 minutes spent in taking in water. The speed on this occasion was in some places 25 1-2 miles an hour, and on level ground, where there was no wind, it was generally 20 miles an hour. On another day, the engine called the Samson, drew fifty wagons laden with merchandise, and, with itself, making a gross weight of above 233 tons, the same distance in 2 hours and 40 minutes, exclusive of delays upon the road for watering, &c. the rate of motion having varied from 9 to 16 miles an hour, and being on an average nearly 12 miles an hour. The coke consumed in this journey was 1762 lbs. or a quarter of a pound per ton per mile. The attendance required is only an engine-man and a fire-boy, the former of whom is paid 1s. 6d. for

* In another place Dr. Lardner states that “the engine which conveyed Mr. Huskisson to Manchester, after the unhappy occurrence which took place at the great trial, moved at the rate of 35 miles an hour.”

each trip, and the latter 1s. The expense of the original construction of the engines, however, and of their wear and tear is very great, though not nearly so great on the latter account, Dr. Lardner assures us, as has been sometimes stated. The price of one of the most improved engines at first, is about £800, and it will travel from 25,000 to 30,000 miles without costing as much more for repairs. Notwithstanding many extra expenses which this undertaking, as the first of the kind, has had to bear, and from the experience purchased by which future speculators will profit, it has been perfectly successful in a commercial point of view. The profits on the capital invested have been from the first above 6 per cent. per annum; and during the latter six months of 1831, it was at the rate of above 8 per cent. per annum; and it has since probably exceeded that amount. The original £100 shares already sell for above £200. On the other hand, the advantages to the public have been as great as to the proprietors. Fully 600,000 passengers now pass by the rail road in the course of the year between Liverpool and Manchester, or four times as many as used formerly to make the journey. The transference of merchandise is also effected both with infinitely greater speed, and at a vast reduction of expense.

Some time ago a work was published by Mr. Gordon, the engineer, on the application of steam as a moving power for coaches on common turnpike roads; the facts contained in which were principally derived from the report on this subject of the Committee of the House of Commons, which was ordered to be printed on the 12th of October last. Dr. Lardner has here availed himself of the information supplied by the same most interesting and important parliamentary paper; some of the curious details given in which we may possibly take another opportunity of laying before our readers. In the meanwhile we can only afford room for the general conclusions to which the committee came on the evidence brought before them. They are as follows:

"1. That carriages can be propelled by steam on common roads at an average rate of ten miles per hour.

"2. That at this rate they have conveyed upwards of fourteen passengers.

"3. That their weight, including engine, fuel, water, and attendants, may be under three tons.

"4. That they can ascend and descend hills of considerable inclination with facility and safety.

"5. That they are perfectly safe for passengers.

"6. That they are not (or need not be, if properly constructed) nuisances to the public.

"7. That they will become a speedier and cheaper mode of conveyance than carriages drawn by horses.

"8. That, as they admit of greater breadth of tire than other carriages, and as the roads are not acted on so injuriously as by the feet of horses in common draught, such carriages will cause less wear of roads than coaches drawn by horses.

"9. That rates of toll have been imposed on steam carriages, which would prohibit their being used on several lines of road, were such charges permitted to remain unaltered."

"The toll-bills complained of have since been repealed. "At the moment that I write," says Dr. Lardner, "several steam carriages are in progress of construction for regular work upon the pub-

lic roads of England. Some are about to be established between Paddington and the Bank, upon the New Road; others between London and Greenwich, and other places in the vicinity of the metropolis. Another, it is stated, is to run between London and Birmingham. The first impulse once received, the progress will be rapid, and the effect of proportionate importance."

ON MALARIA.

Extracts from *Three lectures on the origin and properties of Malaria and Marsh Miasma*, by Professor MAGILL, of the University of Virginia.

[The pamphlet from which the following passages are extracted has very lately issued from the press. There is scarcely any subject which more needs investigation; and but few are of more importance to agricultural interests in a large portion of the United States.]

"The subject of malaria, or marsh effluvium, has for a long time attracted much of the attention of the medical profession, and interested to a high degree the feelings of society at large. Physicians of all countries have tortured their brains, and exhausted all the known resources of the chemical art, in attempting to discover the properties of this invisible agent of disease and death, which prostrating in its silent march whole cities and communities, bids defiance to all the measures hitherto suggested to stay its destructive progress. Unquestionably it is one of the most important subjects which can be presented to the contemplation of man; to detect the causes which originate; to ascertain and define the laws which regulate, and to discover means by which the human family may be shielded from this "pestilence which walketh in darkness," would form a suitable and noble employment for the philosopher and philanthropist, as well as the physician.

"None of all the many "ills which flesh is heir to," has probably been so prolific of destruction and misery to the race of mankind, as miasmatic exhalation.* In all quarters of the world except the frigid and ice-bound north, where perpetual winter "rules the year," this scourge of humanity, has been occasionally found, breathing disease and death upon all within the range of its morbid influence. In the east and in the west, its withering and desolating effects have been felt in all their terrific severity.† Along the classic shores of the Mediterranean it has poured with a liberal hand the "vials of its wrath."‡ The shores of

*It is computed that upwards of one half of the human race perish by fever (in one or other of its forms.) Miasma is the principal if not the only cause of febrile disease.

†According to the report of the committee, consisting of Dr. W. Ainslie, president, and Mr. A. Smith, and Dr. M. Christie, the fever which prevailed in the provinces of Coimbatore, Madura, Dindigul and Tinnevely, in the years 1809, 1810 and 1811, consigned to the grave 106,789 persons, to which may be added the ruin of the constitutions of many thousands.

‡Of all the countries lying along the Mediterranean, Italy has probably suffered most from malaria. Rome, once the proud "mistress of the world," in her career to greatness and splendor, had often well nigh been annihilated by the blighting hand of pestilence. Livy mentions the occurrence of fifteen plagues before the year Ab. Urbe Condita 59, and no one now doubts that they were produced by the pestiferous exhalations

Africa, that region of mental darkness, though harmless to the natives, are fraught with the seeds of disease to the European and American constitution. Witness the lives that have been and still are annually sacrificed upon the altar of Colonization. The extensive marshes of the Netherlands have often proved the sources of severe and wide-spread disease.* Our own highly favored land almost throughout its entire extent, has frequently been visited by extensive and malignant epidemics, increasing in frequency and severity as we proceed southward. The bold and majestic rivers which flow through our country, and beautify its scenery, often prove the source of destructive epidemics. The "king of rivers", the grand and magnificent Mississippi, like the Nile of Egypt, and the Ganges of the east, while it fertilizes the soil by its extensive annual inundations, spreads at the same time far and wide the seeds of disease."

"The steeping of hemp and flax, in stagnant shallow water, (*"ubi palustres disident aqua, ventique silent"*) in consequence of which it has putrid, has also been productive of disease. Lancisi "gives the history (says Bancroft) of an epidemic commonly intermittent, and often resembling the tertiana lethargica of Forti, which for several summers infested, and almost depopulated the ancient town of Urbs Vetus, in an elevated and salubrious part of Etruria; and which was occasioned by ponds or stagnant waters in the lower part of the town, in which hemp and flax were macerated: (*in quibus linum, et cannabis macerabantur,*) but this being prohibited in 1705, the fevers did not afterwards occur."

"Fevers have also been known to arise from the putrefaction of "the vast heaps of indigo plant, which are negligently formed, (after the coloring principle has been extracted) near the works and houses of the laborers, and there left to

from the neighboring marshes. One would have supposed that these severe visitations, before she had acquired the bone and muscle of maturity would have given a permanent check to her growth, but the cupidity and enterprise of man can triumph over apparently insuperable difficulties. All that portion of Italy too, which is bounded on the one side by the Mediterranean, and by the Appennines on the other, and extending from Pisa on the north to Terracina on the south, has been rendered a complete desert by the malaria in which it abounds. This portion of the country (says Griffith) is almost uninhabited, "and the appearance of the few wretched beings whom necessity detains there is frightful in the extreme, exhibiting the effects of the noxious exhalations in every form of bilious disorder." Other countries along the sea coast, have also occasionally suffered from this scourge most severely. In Gibraltar, in 1804, out of a population of about 10,000, there perished from the 1st of September to the 31st of December inclusive, 5,946 individuals, being more than one-half of the inhabitants. In 1810 another destructive pestilence ravaged the same place, which is clearly proved by Dr. Burnett to have arisen from marsh exhalation. In Cadiz in 1800, out of a population of about 60,000, the number of the affected from the beginning of August to the first week in November, amounted to 48,520.

"The famous Walcheren expedition of the British in the year 1809 is still fresh in the recollection of many. Out of sixteen thousand troops, constituting the whole British force, there was on the 23d of September 9,800 prostrate with the fever.

decompose and become manure, which is of an excellent quality, after two or three years. These heaps wetted from time to time by heavy rains, and afterwards heated by the powerful rays of a vertical sun, emit very copiously, vapor, or miasma, resembling in their effects those of marshes, for those persons who live near to, and especially on the leeward side of these fermenting vegetable masses, are commonly attacked by fevers, chiefly remittents, and similar to those which prevail in marshy situations. And according to my information (continues Bancroft) the connexion of these fevers with the heaps of fermenting indigo plants is now so well understood and believed in that part of the world, (East Indies,) that the more intelligent indigo makers no longer permit such heaps to be formed near their works, or the habitations of the workmen, but cause them to be placed at considerable distances, and to the leeward thereof, and thus preserve their laborers in health." Many other instances might be mentioned in which malaria was produced by vegetable putrefaction, but those cited are deemed sufficient to prove the position with which we set out."

"We have already mentioned that four things are necessary to the development of malaria; namely, heat, moisture, vegetable matter, and the contact of air; if any one of these requisites be absent, malaria is not produced. From this fact then we may deduce many of our preventive means; for by removing any one of them we arrest the exhalation of this gas.

Vegetable matter, with the co-operation of heat and moisture will every where produce disease, hence the great necessity of enforcing the utmost cleanliness in all large cities and towns, particularly the removal of all collections of vegetable matter. The streets, yards, cellars, ponds, gardens, stores, &c., should all be made to pass through the most rigid inspection. Much good has resulted from following this course, and dreadful distress has been occasioned by neglecting it. Dr. Rush observes, "in a manuscript of the life of doctor (afterwards governor) Colden, of New York, there is the following fact: It was first communicated to the public in the daily Gazette of the capital of that state, on the 30th of October, 1799." "A malignant fever having raged with exceeding violence for two summers successively in the city of New York, about forty years ago, he communicated his thoughts to the public on the most probable cause of the calamity; he published a little treatise on the occasion in which he collected the sentiments of the best authority, on the bad effects of stagnating waters, moist air, damp cellars, filthy stores and dirty streets. He showed how much these nuisances prevailed in many parts of the city, and pointed out the remedies. The corporation of the city voted him their thanks, adopted his reasoning, and established a plan for draining and cleaning the city which was attended with the most happy effects."

"The United Provinces of Holland, (says Rush) hold their exemption from the plague only by the tenor of their cleanliness. In the character given by Luther of Pope Julius, he says "he kept the streets of Rome so clean and sweet, that there were no plagues nor sickness during his time."

"Ponds of water should never be allowed to exist in cities or towns, or even in their neighbor-

hood. In such situations they too often become the reservoirs of offal matter of every description; which either by gradual accumulation, may finally rise above the surface of the water, as happened in the instance related by Senac, or by evaporation of the water, may become exposed to the action of a hot sun, and in either event may exhale miasmata in abundance.

"But as we have before observed, marshes, strictly so called, are the most fruitful sources of miasmata. These abodes of this pestiferous air, from their great extent and other circumstances, will often not admit even of any attempt to change their nature; and all that is left us in such cases, is to interpose between them and us, the barriers to the progress of malaria with which nature has kindly furnished us, and which will be mentioned in a future part of this lecture.

"Though, however, in many cases no favorable change can be effected, in numerous other instances much has been done to redeem marshes from their noxious state. The experience and industry of man have often triumphed over these laboratories of malaria, and from having been shunned as the foci of disease, they have been converted into the abodes of health and plenty. By a judicious use of ditching, so as to drain the soil of its superabundant water and subsequent cultivation, by which the earth, being frequently turned up to the drying action of the sun and air, wonderful changes have been effected. "With the aid of the purifying sea breeze, this course, (says Ferguson,) at the British colony of Demarara, within six degrees of the equator, has succeeded in rendering the cultivated portion of the deepest and most extensive morass probably in the world, a healthy, beautiful, and fertile settlement."*

"The *Campagna di Roma*, now the abode of pestilence, was once comparatively healthy, and was indebted for it in a great measure to the "constant tillage," and "to the extreme attention paid to draining the deposits of stagnant water," and to the aqueducts which then traversed it in every direction. "These, however, being broken down and destroyed by the Goths, by which the country became overflowed, it soon became excessively sickly.

"In the neck below Philadelphia, since it has been drained, its agues have disappeared."

"The clearing of wet land, should be followed up immediately by cultivation. Land of this description having on it a growth of timber, should never have its wood cut down without the specific purpose and power immediately to devote the soil so cleared to agricultural uses; because experience has taught that the mere clearing of marshy land, is almost certain to be followed by disease in its neighborhood. In proof of this, Dr. Rush says, "it has often been observed, that families enjoy good health, for many years in the swamps of Delaware and North Carolina, while they are in their natural state, but that sickness always follows the action of the sun upon the moist surface of the earth, after they are cleared. For this reason the cultivation of a country should always follow the cutting down of its timber, in order to

prevent the new ground becoming, by its exhalations, a source of disease."

"Dr. Robert Jackson also says, that "in this country, (America,) the unhealthiness of a place is often obviously increased by cutting down the woods of the neighboring swamps; therefore, no rule is more liable to exceptions, than that which has been so generally enforced, namely, that clearing a country of its woods invariably renders it healthy; unless the grounds be drained and cultivated as well as cleared, the effect is likely to be the reverse."

"Many places, previously healthy, have become immediately sickly upon cutting down an intervening wood between them and the marsh, and on the other hand, many situations before sickly have been rendered healthy from the growth of trees between them and marshy grounds. Dr. Jackson says, "histories abound with examples of destructive epidemics, which have followed the cutting down on the groves which covered morasses or intercepted the approach of malaria."†

Dr. Lisle in his memoir on malaria, translated by Dr. Johnson, and incorporated in his work on tropical climates, says "upon Mount Argintal, above the village of St. Stephano, there is a convent which has lost all the reputation for salubrity it once enjoyed, since the lofty trees by which it was surrounded have been cut down."

"He also says, "I have been informed by persons worthy of credit, that in consequence of felling the wood before Asterna, near the Pontine marshes, Veletri was visited for three successive years by disease which made much greater havoc than usual throughout the whole country."

"We will now mention those means of obviating the effects of malaria, which are furnished us by our knowledge of some of its properties. The first rule we would suggest under this head, and it is one of cardinal importance too, is by all means to avoid the evening or night air, as well as an exposure to the atmosphere of the morning previous to sunrise. The reason of this rule will be obvious, when it is recollected that miasma is dispersed by heat of the sun, during the day, and that as soon as he withdraws his beams and sinks below the horizon, it begins to descend, and remains in the lower strata of atmosphere, until it is again rarified and dispersed by his kindly rays. The instances already cited, show conclusively this characteristic of malaria, and will impress more strongly than any words of mine can do, the necessity and advantage of the caution suggested."

"De Lisle says, "the evening dew is so much dreaded at Rome, that as soon as it begins to be perceived, all the inhabitants shut themselves up in their houses;" and again, "the people of Italy, and I suppose of all countries where the air is bad, never go abroad, unless absolutely obliged, till after sun rise, when the heat has dispersed the pernicious vapors that have fallen during the night."

"In the next place we would recommend, that the upper apartments of houses should be used for sleeping; experience clearly establishing the fact, "that the lower you are the denser are the strata

* Phil. Journal, No. 13, p. 20.

of miasmata," and consequently the more violent the effects arising from it. We have already mentioned several examples in proof of the superior salubrity of the second stories of houses, and need not repeat them here."

"The burning of a number of fires so as to disperse the malarial, by the artificial heat thus created, has often been used with good effect, in warding off its attacks. Heat produced in this way, no doubt operates in the same manner as the heat of the sun, dilating and rarifying the gas in question, and forming an upward current, by which it is carried off."

ON RIDGING THE GROUND FOR MELONS.

From the Genesee Farmer.

I read the communication of my worthy friend W. W. B. on ridging the ground for melons with respectful attention, and have since appraised him that when ready, I would attend to the subject. He suggests that his failure was "probably in part owing to the season, and partly to the nature of the soil," with which I acquiesce. The season was remarkably unfavorable to the growth of melons. I have inquired of four of our best gardeners, who have generally been very successful in this culture, and their answers have all been nearly to the same import: no success, or only a few melons of inferior size. Their grounds were *not ridged*. To this testimony, I may add my own; and though I planted in a ridge, my water melons were very few and inferior; but my mush melons were good, and some were truly excellent.

I think there can be no doubt that the soil in which melons are cultivated, should allow a quick transit to the water in rainy weather. I was interested with Judge Buel's account of the experiment of *underlaying the bed with straw three inches thick*. In a late conversation with an excellent farmer, he remarked that he had generally been successful in growing melons, whenever he had planted on a sod ploughed up and down the slope, so that the water could drain off *under the sod* along the bottom of the furrows. He was careful to apply rich compost, or some equivalent manure to hasten the vegetation of the plants; and he considered this of more consequence, as the earth on a sod newly inverted, is often crude and not sufficiently pulverized.

From the following communication, written by my esteemed friend Dr. Stephen Mosher, at my particular request,—it would appear that melons do best when the stable manure is *in a mass* and covered up with earth. In my ridge it was *mixed with the soil*:

"I received yours of the 31st ultimo, requesting the particulars of my success in raising melons on mounds and ridges. My first trial was on a new piece of sward ground which was ploughed for the purpose of forming a garden. On this I had drawn three loads of fresh stable manure, which was thrown into one heap, and covered with inverted sods to the thickness of six or eight inches, in the form and manner of covering a large potato hill, which was when finished, perhaps four feet high, and ten feet in diameter. On four sides about half way to the top, I made four excavations through the turf and *into the manure*, about eighteen inches in depth and diameter, partly fill-

ing the holes with fine rich earth so as to form four level hills. In each of these I planted five or six water melon seeds of what we call the Carolina variety, at the same time that I planted about four square rods of the ground surrounding the heap, at the usual distances, with the same kind of seed. Within three days, the seed on the mound came up and grew most luxuriantly, while those planted in the adjacent ground, did not come up in less than fifteen days. During this time, the weather was unusually cold for the season; and though several frosts occurred, yet the plants were not damaged in the least. When those on the level ground came up, pale and sickly,—each of the former had four large green leaves.

"The result was, these four hills planted on the mound, soon began to run, and took possession of nearly the whole four square rods, against which progress those on the ground made but a feeble resistance. And from these four hills I am sure I had a good wagon load of as fine melons as I ever saw. From one single plant alone I weighed five melons that overran twenty pounds each—one of them weighed twenty-five pounds; and on the same vine were more than that number of smaller size. The produce of those planted round the heap was small and of little value.

"The last season, I varied the experiment by digging a trench three feet wide, eighteen inches in depth, and some rods in length,—throwing the earth out on each side. This trench was filled to the level of the common earth with fresh stable manure, as in the first experiment, when it was levelled and firmly trodden down. The earth, consisting of a *sandy loam*, was then thrown back on the manure, forming a ridge about a foot in height, gently rounded on the top. Along the middle of this ridge, I planted seed, both of the water and mush melon, which came up in about four days, and grew luxuriantly, *suffering less in dry weather than plants in the vicinity on the level ground*, and producing an abundant crop of very fine melons."

These results are entirely in favor of ridging; but of the propriety of treating in that manner such a soil as W. W. B. cultivates, I presume not to judge. That kind of land however, constitutes but a very small proportion of our country. A heavy loam is the most prevalent,—though sandy tracts, and some of considerable extent, occur in different places. It may therefore be safe to conclude from the experiments reported, that melons should be planted on mounds or on ridges in nine-tenths of the gardens in the Genesee country. D. T.

Greatfield, 4 mo. 21, 1834.

HORSES IN BRAZIL.

The great increase of these animals, in a land where none of the same genus had existed before the discovery, altered even the physical features of the country. The bulbous plants and the numerous kinds of aloes (*pitao* or *caraguatas*) with which the plains were formerly overspread, disappeared; and in their place the ground was covered with fine pasturage, and with a species of creeping thistle hardy enough to endure the trampling by which the former herbage had been destroyed. The insect as well as the vegetable world was affected, and the indigenous animals of the country, birds as well as beasts of prey, acquired new habits.—*Southey's Brazil*.

ANSWER TO AN ILLEGIBLE LETTER.

[Archdeacon Coxe wrote so illegibly as to draw from a friend the following good humored reproof. The plan suggested might be adopted with as much advantage by some of our correspondents, as by him for whom it was proposed.]

Mongewell, Jan. 8th, 1798.

'Dear Sir,—A Frenchman of high rank under the monarchy, answering a letter which he had received from a person of similar rank, expressed himself thus:—"*Par respect, Monsieur je vous écris de ma propre main; mais, pour faciliter la lecture, je vous envoie une copie de ma lettre.*" I will in future forgive the want of respect, if you will have the goodness to follow this Frenchman's example. I wish to comply with your request, for so far I can decipher, that there is a request—but I must beg to know from your amanuensis what it is.

'I am, dear sir, with much regard,
Your faithful servant,
'S. DUNELM.

A VISIT TO HOFWYL.

From the London Penny Magazine.

We have received the following interesting communication from a correspondent upon whose accounts we can place a full reliance. The establishments for education, which have been founded and matured in Switzerland, by the public spirit and laborious perseverance of M. Fellenberg, have now existed about thirty-two years. Their high merits have been long familiar to the English public. At the present time, we understand that certain political dissensions, which have produced much ill-will and unhappiness in the canton of Berne, have had the common effect of all violent contests of opinion,—they have made men indifferent or opposed to those institutions for the amelioration of the human character, whose great object is to elevate our species above the intolerance and narrowness of party-feeling. We trust that the open or concealed hostility which, it is said, now threatens the excellent establishments of M. Fellenberg will speedily be put to shame by the good sense of the people of Switzerland; who will perceive in such institutions the surest preservation against the outbreaks of a mistaken zeal for freedom, on the one hand, and the tyranny of exclusive pretensions, on the other.

In the month of August, 1832, I travelled into Switzerland for the purpose of making myself acquainted with the schools and institutions at Hofwyl. Situated about three leagues from the picturesque capital of Berne, amidst a beautiful scenery, composed of a cultivated vale, the Jura ridge of mountains, a pine forest, a small lake, and the glaciers of the Bernese Alps, stand the extensive buildings of the establishment, surrounded by about two hundred and fifty acres of farm land. Upon my first arrival, before I could obtain an opportunity of presenting my letters to the benevolent founder, I wandered about in various directions,—all was business and activity. Here was a troop of lads cutting the ripened corn, while another troop was engaged in conducting it to the

barns. Here was the forge in activity, and there some little gardeners performing various operations in small plots of ground that were portioned out: here were a group of little girls gleaning, there others carrying water, most of them singing while thus employed. But my attention was peculiarly arrested by about one hundred men, who in a large open building, erected in a recess of the garden, appeared to be engaged like boys in a school-room; over the entrance was inscribed this motto, "The Hope of their Country."

I was at last fortunate enough to be admitted into the study of M. de Fellenberg,—a man somewhat advanced in years, with a countenance beaming with intelligence and kindness. De Fellenberg was, by birth, one of the ancient aristocracy of the country, and in possession of the hereditary property of his family. He determined upon devoting his fortune, and the labor of a life, in the endeavor to effect the regeneration of his native land, by the means of education. "I will infuse good habits and principles into the children," said he, "for in twenty short years these children will be the men, giving the tone and the manners to the nation." For thirty-two years has he pursued his steady course, increasing in influence, and extending his establishment as his scheme grew upon him, until it has become what he described to me. "This," said he, pointing to a large building, "is the institute for the boys of the higher classes. Here are their dining-rooms;—arranged on each side of yonder galleries are their dormitories. Here you see their gardens, their museum, their work-shops, their school-rooms; here their gymnasium where they exercise themselves in wet weather, here their stream of running water where they bathe every day: study is their employment, bodily labor their recreation,—but bodily exertion I insist upon. There is no health, no vigor of mind, no virtue without it. Those persons grown to manhood, who are mixing with the boys, are placed by me to observe every action, and catch every expression. My grand object is to comprehend thoroughly the character of my pupils, in order that I may work more efficaciously upon them. These persons are by no means considered as spies by the boys; they are their companions. At Hofwyl all that is not in itself wrong is permitted. I never like to forbid a thing when I am unable to assign a reason for doing so: it creates a confusion in young minds with regard to principle, a thing most dangerous to their future happiness. We have no boundary-mark, yet my boys stay at home; we interfere not with their pleasures, yet they cling to their duty.

"Within this enclosure is my eldest daughter's poor school for girls. She has about a hundred under her direction, who are fed and clothed by the establishment. To these she devotes her entire time. They learn all that in after-life will be of service to them:—to clean the house,—to cultivate the garden,—to sew,—to make all those little necessities which are of so much importance in the cottage; to read, to sing,—to be cheerful, and to be happy. Unless our women be brought up in modesty, and with industrious and religious habits, it is in vain that we educate the men. It is they who keep the character of men in its proper elevation.

"Here is my school for the middling classes,—here all instruction has reference to practical pur-

*Through respect, sir, I write to you with my own hand; but to facilitate the reading, I send you a copy of my letter.

poses. Man was born to have dominion over the earth, and to subdue it, but it is by the intellect alone that he can do so. His unassisted strength what is it? To conquer Nature he must understand her. Look in here, and you will see the laboratory of the chemist, and the lever and the pulley of the mechanic.

"In these two buildings are my poor school for boys, who are boarded and clothed by the establishment. And well they earn their maintenance, for the little fellows work ten hours a day in the summer; and the expense that I incur in their behalf is nearly repaid by their exertions. They study for two hours each day, and this I consider sufficient. The case here is the reverse of the Institute, for bodily exertion is the labor, and study the recreation. The habits I bring them up with are those which I desire should continue with them through life; they consequently have reference to their probable position in society. The habit of continued study would ill-become a person destined to gain his livelihood by his hands. Although there are now one hundred boys assembled here, mine were but small beginnings. I had but one pupil at first. It was long before I could find a master in whom I could confide. Do you observe those little patches of garden-ground? Each poor lad has one to himself; and the produce belongs exclusively to him. They usually dispose of it to the establishment, which either pays them the money at the time, or lodges it for them in a little bank I have founded. Many of them have very considerable sums there. It is here that they obtain a habit of passing the greater portion of their time in continued and patient labor;—they become acquainted with the value of labor by the produce of their little gardens. The instruction that I give them, although somewhat more elevated than what is generally obtained by persons of their rank in life, is directed to the rendering perfect the senses and reflection,—to make them better practical men; drawing, the sciences of arithmetic and geometry, a useful selection from the other sciences, all taught in the most unostentatious manner: the history of their native country, and an acquaintance with the different natural objects around them, together with music, form the extent of their literary instruction.

"Religion is inculcated in every way. Public prayer, both at church and at school, is regularly performed in common with the schools of other countries. Besides this, these poor lads are taught to see the Creator in his works. When their admiration is roused by a natural object, they are accustomed to direct their thoughts to its Maker.

"But here," said my venerable companion, "is the engine upon which I rely for affecting the moral regeneration of my country (and my attention was directed to the men whom I had before seen in the morning;) these are the masters of village schools, come here to imbibe my principles and to perfect themselves in their duty. These men have six thousand pupils under them; and if, by the blessing of God, I can continue the direction of them, success is certain."

To insure success M. de Fellenberg spares no pains,—no expense. There are no less than thirty-two professors solely devoted to his establishment, who inhabit a house to themselves upon the premises.

In all, there are about three hundred and fifty

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individuals in this little colony. Despite of his enemies, the spirit of De Fellenberg is spreading throughout Switzerland; and after having seen the parent institution, I visited several of his establishments in some of the remotest cantons.

A week closed my short sojourn at Hofwyl. I quitted it with a heavy heart; and the recollection of the moral beauty of what I there witnessed will remain riveted on my memory for ever.

THE TANNIER.

From the Southern Agriculturist.

The tannier is a delicate and excellent substitute for the potato, possessing some advantages over the sweet and Irish. It can be eaten with impunity by those who dare not touch potatoes; they will keep better also, and are good throughout the summer. This plant was known and valued by the ancients, who used both the leaves and roots. There is little doubt of its having been introduced into the West Indies, at their early settlement by the Portuguese and Spaniards, and into South Carolina from Jamaica.

It was classed by the early botanists among the Arums, as will appear by a reference to Linnaeus and Miller; but the moderns, (as I am informed,) place it among the Caladiums. Sloan, in his History of Jamaica, mentions it as *Arum Maximum Egyptiacum*, and says, it was brought into Portugal from Africa, where it grows wild—that the slaves love it very much—that the hippopotamus lives on its roots, in Egypt—and the people feed on it as we do on turnips. Tayas or eddoes are eaten in Jamaica, and cause a heat in the throat, called scratching of the throat, and therefore only eaten by negroes. Sloan gives a very interesting account of this plant.

At the early settlement of Carolina, many negroes were brought into it from Jamaica, and no doubt by them it was introduced. The name tannier is derived from Tayas, (for in the course of my researches on the subject, I can find the word only in Dr. Willich's Domestic Encyclopædia, and Mr. Webster's new Dictionary;) the former under the word eddoes, says, "another variety of the tannier, both these resemble each other, except that eddoes, are smaller, more acid, and require longer boiling than tanniers—they are planted in South Carolina"—and goes on to give some account of the mode of culture, &c.

I would beg leave to refer the reader for his amusement, to 1st vol. Sloan's Jamaica, p. 166, and 2d vol. p. 367—also Willich's Domestic Encyclopædia, (read eddoes,)—Rees' Cyclopædia, (title Arum.) Webster must have got the word tannier from Willich. See also Curtis's Botanical Magazine, vol. 21, No. 832, read Calla Ætheopica, a colored representation of leaf and blossom, from the production of an English hot-house. It is a perfect dwarf, compared to the production of our fields, which are magnificent and beautiful, the leaves often measuring three feet in length and two feet in width, of a perfect green color and velvet softness, and a leaf stalk three feet long and an inch in thickness.

Catesby in his 2d vol. p. 45, gives also a colored representation, in miniature, and says, "A little before I left Carolina (100 years ago,) there was introduced a new kind, wholly without that bad quality (scratching the throat) and requiring no

more than common time to boil, and may be eaten raw without offending the throat; this was a welcome improvement among the negroes, and was esteemed a blessing, they being delighted with all their African food, particularly this, which a great part of Africa subsists on."

I will now give you my *method of cultivation*. Time of planting from the middle of March to the first of May—soil rich and loose—neither too high and dry, or too low and wet. Where old hog pens have been, answer well; at all events the ground should be well manured to ensure a good crop; after the ground has been well dug up and levelled, make up hills three feet apart every way, or four feet if the ground is very rich, the hills not to be as large or as high as potato hills. If you have no small tanniers, take the larger ones, slice off the top or crown part about an inch thick, and quarter the remainder lengthwise, making five pieces from each; plant one small tannier, or one of the cut pieces (cut side down,) in the middle of each hill, about five inches deep—when up, and two leaves unfolded, haul up the earth to them and hoe the grass between the hills—three times hauling up will be sufficient, as the leaves soon prevent the further use of the hoe—nothing more will be required until harvest.

As soon in October or November as the leaves indicate a smart frost, cut them off about a foot from the hill, and dig up the roots carefully, expose them to the sun and air all day, at night pile them up and cover them lightly with the leaves, or put them into the barn, first shaking off as much of the dirt as you can—in a few days you will find the stems of the leaves soft and rotting—you must then pare them off close to the root—trim off the fibrous roots—put them in your potato house, or other close place—separating the larger for use, and the smaller for the next year's planting; no vegetable is more easily cultivated, nor keeps better throughout the year.

The tannier should always be peeled before boiling, and the large roots cut into two or three parts, and three hours boiling will be sufficient.

WILLIAM LOGAN.

ACCOUNT OF 'FIVE HUNDRED POINTES OF GOOD HUSBANDRIE,' &c.

By THOMAS TUSSEY, Gent. first published in 1652.

From the [Edinburgh] Farmers' Magazine.

Sir—The valuable papers in your Magazine, entitled, 'View of the Progress of Agriculture in Great Britain,' seem to have induced some of your correspondents to peruse the works of our earliest writers on rural affairs, which formerly had been thought unworthy of notice. It may excite surprise, in this book-making age, that the number of British agricultural publications, prior to 1700, should be comparatively so very limited, and that none should be known to have existed prior to 1534. There appear to have been a few French translations circulated before this period; but history assures us, that Fitz-Herbert is the first English author who wrote expressly on husbandry; and hence he has been frequently styled the Father of husbandry.

In perusing the earliest writings on husbandry, it is not to be expected that the modern agriculturist is to derive much professional information.

But certainly it is both pleasing and interesting to know the ancient state of agriculture, and the successive improvements it underwent. I therefore cordially approve of the plan you have adopted of giving a short view of the leading doctrines taught in our early works on that subject; and cannot help thinking, that a new edition should be published of the greater number of them.

The object of the present communication is to give an account of the 'Five Hundred Pointes of Good Husbandrie,' &c. by Thomas Tussey, somewhat more full than is exhibited in the 'View of the Progress of Agriculture in Great Britain.' This book was published in 1652, and has gone through several editions. The one before me is dated 1580. It is written in rhyme, but cannot, in general, boast of the beauties of poetry. It contains much extraneous matter, particularly on religious subjects, a custom then very prevalent. But it has always been considered as containing a pretty faithful view of the state of agriculture at the time it was written.

It appears, from Epistles to Lords Paget, father and son, and from an article with the title of the 'Author's Life,' that Tussey was born of a good family at Rivenhall, in Essex; received a liberal education; went to Court, where he seems to have been patronized by Lord Paget, and, for ten years, lived as other thoughtless young men do. He then married, and retired to Suffolk, where he seems to have engaged in agriculture rather from necessity than choice. It was here he first formed the plan of his Book; though, at this time, he does not appear to have had any high idea of the profession.

'As in this booke, who list to looke,
Of husbandrie, and huswiferie,
There may he find more of my minde

Concerning this:
To carke & care, and ever bare,
With losse and paine, to little gaine,
All this to have, to cram Sir Knave
What life it is.'

He did not live long in Suffolk, and indeed seems to have been too restless a person to remain long in any situation. After many vicissitudes, the last notice of him is, that he fled from London during the Plague, and settled at Cambridge, and probably obtained some appointment in Trinity College, where he had completed his education. In his early years, he had been a singing-boy in a cathedral, and probably now turned his musical talents to some account; for, among other shifts 'to help to live,' he says,

'Let musicke win, let stocke come in.'

He seems to have been altogether a very eccentric sort of person, but withal, at least in his latter days, remarkably devout and repentant, and very anxious to put young people on their guard against the follies in which he had himself once indulged.

The Booke of Husbandrie before us, after 14 chapters of preliminary matter, complimentary, quaint, and somewhat dolorous, begins with September, and proceeds in regular succession, through all the other months of the year, though the observations on the operations proper for that month, are not supposed to commence till Michaelmas, the term of entry to farms in England; and the observations in August are to be understood as extending to that period.

Instead of following our author's plan, we shall give a short view of some of the courses of management he recommends. This will enable our readers to perceive more clearly the justness of his doctrines. We may first take notice of the agricultural implements then in use. A description of these is given in September, the beginning of the English farmer's year under the title of 'a digression to husbandry furniture.' Barn utensils are first enumerated, which need not be minutely detailed; though upon a reference to the book itself, they will be found to have been complete for the time. The two chief utensils are, however, wanting—the fanners and thrashing machine. The stable utensils are next adverted to; and then follows a description of the implements more immediately connected with field operations. Both these inventories contain hints which may be found instructive even to the farmer of the present day. The plough, harrows, and roller then in use, are merely named; so no opinion can be given of their construction or fitness for use. In regard to the first, it appears that both chain and swing-ploughs were employed; and our author recommends

'Two ploughs and a plough cheine, 2 culters 3 shares,
With groundclouts and sideclouts for soile that so tares.'

Horses and oxen are stated generally to have been employed in agriculture; but nothing is said regarding their comparative utility. He however recommends, with great propriety, that oxen to be used in draught be kept in good condition, and well shod. In regard to summer-fallowing, he recommends that it receive the first ploughing in January, the second in May, and the third in July; after which to harrow it, and let it remain in that state till it shall be found convenient to 'composse' (dung) it, when it is to be laid up, by which must be meant a fourth and last ploughing. With this treatment the fallow could not be properly cleaned, the weeds having been allowed to grow from May to July; but as cultivated herbage does not seem to have been then introduced, this was probably thought profitable management in the circumstances of the case. We shall take the liberty of quoting our author's sentiments on this subject.

'JANUARY.

'Who breaketh up timely his fallow or ley,
sets forward his husbandrie many a way.
This timely wel ended doth forwardly bring
not only thy tillage, but all other thing.'

'MAY.

'In Maie at the farthest, twifallow thy land,
Much drouth may else after cause plough for to stand.
This tilth being done, ye have passed the wurst,
then after who ploweth, plow thou with the furst.

'AUGUST.

'Thy fallow once ended, go strike by and by
both wheatland and barlie, and so let it lie:
And as ye haue leisure go compose the same,
When up ye do lay it more fruitful to frame.'

It does not appear that any drilled crops were cultivated. Turnips are mentioned merely as a garden crop. The crops cultivated are stated to have been—wheat, barley, oats, peas and beans, fitches, rye, flax, hemp and hops. Three varieties of wheat are treated of—white, red and gray. Peas, white and gray, are spoken of as being in common cultivation. No varieties of oats and barley are adverted to. No mention is made of any pre-

paration being given to any particular species of seed to prevent disease in the crop; nor is disease at all spoken of. He recommends early sowing, and the selection of the best qualities for seed; and is very particular in regard to harrowing and drawing of water furrows. Nothing is said of draining, which is rather remarkable. The advice regarding the management of dung in February is incorrect, though too much sanctioned by the practice of later times; but the mode of applying it is judicious, and too little attended to in the present day. On these subjects we shall quote our author's words—

'Who laieth on doong er he laieth on plow,
such husbandry useth as thrift doth allow,
One month er ye spred it, so still let it stand,
er ever to plow it, ye take it in hand.
'Place doong heape alow, by the furrrough along,
where water all winter time did it much wrong;
So make ye the land to be lustie and fat,
and corne thereon sown to be better for that.'

But it must be observed, that the dung, applied at other periods of the year, is recommended to be covered in as soon as convenient; and some judicious hints are given in regard to collecting it. The author is silent on the subject of leases, as well as on that of serfs or bondsmen. The latter had probably been all emancipated before his time, and the former were perhaps very rare.

Soils are not particularly treated of. All that is said of them regards their adaptation for particular crops. The author's sentiments on this subject shall be extracted.

'Each soil hath no liking of every grain,
nor barlie and wheat is for every vaine.
Yet know I no countrie so barren of soile,
but some kind of corn may be gotten with toile.
'As gravel and sand, is for rie and not wheat,
(or yieldeth her burthen, to tone the more great)
So peasen and barlie, delight not in sand,
but rather in claie, or in rottener land.

'Gray wheat is the grossest yet good for the clai,
though woorst for the market, as fermer may say.'

The mode of cropping enjoined in the Booke of Husbandrie is, in general agreeable to the rule which regulates modern practice. Two successive white crops are not recommended; but alternate white and pulse crops, or fallow, are directed to be taken as the most advantageous. We cannot do our author greater justice than by quoting his own words on this subject; from which it will appear, that his mode of cropping was, in the circumstances of the times, not only preferable to the plans of cotemporary writers, but the best that can be conceived in regard to the arrangement of the crops then cultivated.

'Otes, rie, or else barlie, and wheat that is gray,
brings land out of comfort, and soon to decay;
One after another, no comfort between,
is crop upon crop, as will quickly be seen.

'Still crop upon crop many farmers do take,
and reap little profit for greedines sake; [stand,
Though breadcorne and drinkcorne, such croppers do
count peason or brank, as a comfort to land.

'Some useth at first a good fallow to make,
to sow thereon barlie, the better to take;
Next that to sow pease, and of that to sow wheat;
then fallow again, or lie lay for thy neat.

'Where rie or else wheat, either barlie you sow,
let codware be next thereupon for to grow,
Thus having two crops, whereof codware is ton,
thou hast the less need to lay cost thereupon.

'Two crops of a fallow enricheth the plough,
though tone be of pease, it is land good enough.
One crop and a fallow some soile will abide;
where, if you go furdur, lay profit aside.'

A number of sensible remarks are also made regarding the weeding, harvesting, thrashing, and disposing of the respective crops, some of which were applicable only to the then existing state of things; but others deserve attention at present.

The benefit of enclosures was duly appreciated by Mr. Tusser; and the importance of this measure was rendered doubly great, from the circumstance of many of the possessors of open lands being at that time not very scrupulous in observing the line of their marches. In reference to which he says,

'The country enclosed I praise,
the tother delighteth not me.

'More plenty of mutton and beefe,
corn, butter, and cheese of the best;
More wealth any where, (to be briefe)
more people, more handsome and prest,
Where finde ye? (go search any coast)
than there where enclosure is most.

'More profit is quieter found
(where pastures in severall be)
Of one silly aker of ground,
than champion maketh of three.
Again, what a joy is it known
when men may be bold of their own?'

A number of good observations are to be found regarding the treatment of Live Stock, which it may be unnecessary to exhibit in detail. It may, however, be proper to take notice of the very ill judged, and, in many instances, ruinous practice which then prevailed, of milking ewes for too long a period after weaning their lambs. Yet experience has not been found so convincing as to abolish this reprehensible measure in the present day, although some have suffered severely by it. Our author says,

'At Lammas leave milking for fear of a thing,
least *requiem aeternam* in winter they sing.'

Throughout the Booke are dispersed many observations on gardening, addressed to the housewife; from which it appears that Tusser considered the culture of the garden as her peculiar province. Upon this we shall also say, that if the ladies of the present day were to undertake this charge, it would at least put to silence the well known proverb, that good farmers are always bad gardeners.

VETERINARY PRACTICE.

From the British Farmers' Magazine.

An operation of an unusual description, and attended with great success, was lately performed by our townsman, Mr. J. Barrett, veterinary surgeon, on a valuable cow belonging to Robert Winslow, Esq. of Wilton, Somerset. The removal of the sub-maxillary sparrowed gland, commonly called wen, which had been increasing in size beneath the lower jaw, for the two past years, and for the last two months appeared to endanger the life of the animal from suffocation and starvation, occasioned by its extreme pressure on the windpipe. The incision that was necessarily made on the part, measured twelve inches: and an arduous dissection was then necessary on account of the ad-

hesion of the glands, and the nicest precision was required in separating the inferior maxillary artery, as well as the jugular vein; but the hæmorrhage was inconsiderable. The relief afforded the animal was instantly apparent, and truly gratifying to those who saw the operation. The animal is now quite well, and much improved in condition and appearance. The gland weighed five pounds. The improvements daily making in veterinary practice must be highly satisfactory to gentlemen possessing valuable animals; and the advancement of this branch of science, which has been so many years neglected and left in unskilful hands, promises very desirable benefits to society.

PECULIAR BREED OF SHEEP IN THE NEPAL COUNTRY.

The huniah is a large tall breed, with slender, compressed, spirally-twisted horns, and short narrow tail. Though now naturalized in the Kachar, it is of trans-Himalayan origin. The color is almost invariably white. Individuals of this species are apt to have three, four, and even five horns. The huniah cannot bear the heat of Nepal south of the northern division, and will doubtless flourish in England, where the experiment is making of naturalizing it. Its wool is superb.—*Journal of the Asiatic Society of Bengal.*

ADULTERATION OF MILK.

From the Edinburgh Medical and Surgical Journal.

The subject of the adulteration of milk has been lately investigated with great care, by M. Barruel of Paris. Although his observations are intended to apply only to the milk of that city, yet there is little doubt that they will also be found applicable in a greater or less degree to all great towns. He sets out with stating that all instruments for ascertaining the purity of milk, which are calculated to attain this end by pointing out differences in its density or specific gravity, are inaccurate and useless. For, on the one hand, pure milk differs much in density, according to the fodder used by the dairy-man for his cows, the butyraceous matter which imparts lowness of density, being made to preponderate by some sorts of food, and the caseous part, which increases the density, being made preponderant by other sorts. And, on the other hand, although water, the ordinary substance with which milk is adulterated by the dealers in the French capital, would alone cause a great diminution of density, the dealers know very well how to prevent that effect, and so render the areometer useless. For this purpose, it is only necessary to dissolve in the milk a little sugar-candy, which is required at all events in order to correct the flat taste imparted to milk by diluting it with water. The result of M. Barruel's inquiries on the adulteration of milk in Paris, is, that no positively noxious substance is ever to be found in it; that a common practice is to remove a considerable portion of the cream, by allowing the milk to stand for a limited time, and then to dilute the remainder, or skimmed milk, with water, and to give it the apparent qualities of new milk in one or other of the manners now to be mentioned. The opacity of the milk being much diminished by the water, so that the milk acquired a blueish appearance, it was at one time usual to correct this defect, by previously mixing wheat-flour with

the water with which the milk was diluted. But this adulteration was too obvious to the senses. Any person even of indifferent delicacy of palate, could detect the altered taste of the milk; and besides, after too hours' rest, the flour sank to the bottom, restoring the translucent blueness of the milk, and pointing out the nature of the fraud. To prevent this inconvenience, the dealers boiled the flour in the water before mixing it with the milk; and in this way an opaque mixture was procured, which retained its opacity on standing. As even with this addition the fabricated liquid had a flat taste, sugar or sugar-candy was dissolved in it, by which means the peculiar sweetness of the milk was partly restored. This adulteration, however, has become so easy of detection by means of iodine, which renders the mixture blue by its action on the fecula of the flour, that M. Barruel believes that the fraud now described is very little practised in the present day at Paris. In Britain, where the municipalities take no charge whatever of the purity of this most important article of food, it may be presumed that the adulteration with flour, sugar, and water is common enough, as it is a simple and cheap mode of accomplishing every purpose of the fraudulent dealer. The best mode of proving the presence of farinaceous matter in such mixtures, is to heat the milk with a little sulphuric acid, to coagulate the casein, to filter the whey, and then to add to the latter the tincture of iodine; upon which a fine blue color will be struck. Driven from this species of adulteration, the Parisian dealers have latterly resorted to another so ingenious, that M. Barruel conceives they could not have discovered it, without the aid of some scientific person. The method is simple, so cheap, that for ten-pence the opacity and color of the milk may be imparted to thirty English pints of water, and so far secret that no disagreeable taste is communicated. This is nothing more than the employment of an emulsion of almonds, for which some dealers, more greedy and less cautious than the rest, have substituted hemp-seed, which however, is apt to impart an acrid taste. By either of these means the milk may be diluted to an indefinite extent; and the only corrective required is a little sugar-candy to remove the flat taste. A peculiar advantage possessed by this mode of adulteration over every other is, that the vegeto-animal matter or vegetable albumen of the emulsion by which the oil of almond is held in suspension, is coagulated, or curdled, like casein, by acids. The method recommended by M. Barruel for detecting the fraud is founded on two circumstances,—the greatly inferior quantity of coagulum formed by acids in the mixture of milk and almond emulsion, compared with that formed in milk alone, and the facility with which, by kneading the coagulum with the fingers, oil may be squeezed out of the former, while none exists in the latter. On examining carefully four different specimens of pure milk, procured from different quarters in Paris he found that 300 parts of each, coagulated by heating them with an equal volume of vinegar, gave each a quantity of curd, which, when well drained, and equally pressed between folds of bibulous paper weighed 29 parts; and that the same quantity of milk taken from a cow in presence of a person sent to procure it, gave 30 parts of curd. He then found, that when the same milk was mixed with

various portions of water, the quantity of curd was exactly in the inverse ratio of the proportion of water added. The water, therefore, did not prevent any portion of the curd from being thrown down by the usual modes of curdling the milk. He next found, that, if a given quantity of sugar was added to the mixture of milk and water, the quantity added could be separated exactly by evaporating the whey to the consistence of an extract, heating this with alcohol, filtering the alcoholic solution, and evaporating to dryness. He then also found, when equal parts of almond emulsion and milk were mixed together, 300 parts of the mixture, curdled by vinegar as above, gave 16½ parts of curd; and that the same quantity of mixture containing two parts of emulsion to one of milk, gave only 10 4-5th parts of curd. So that although, as was to be expected, the adulteration with almond emulsion did not lessen the quantity of curd to the same extent as adulteration with water only, yet the decrease was very great, and very nearly in the ratio of the quantity of emulsion added. Lastly, on placing pure curd on white paper, no oily matter was thrown out; but the curd procured from the mixture of milk and almond emulsion, besides being less firm than the former, gave out in 24 or 48 hours, a quantity of oil sufficient to stain the paper. Another adulteration to which milk is subjected in Paris, is with carbonate of potass or soda. The object of this variety of adulteration is, in the hot summer months, to prevent the milk from becoming sour and curdling, or to break down the curd and correct ascendency when the milk has actually become spoiled. In this process, acetate of potass or soda is formed. Neither of these salts, in moderate quantity, is injurious to the health; indeed, acetate of potass exists naturally in milk, and is the source of some embarrassment in the detection of the present fraud. The mode of analysis adopted by M. Barruel is as follows:—As the alkaline acetates are converted by incineration into carbonates, he endeavored, by means of this property, to ascertain the quantity of alkali naturally contained in whey. He therefore, evaporated a certain quantity of whey to dryness, incinerated the residue in a platinum crucible, and procured an alkaline ley from the remainder, which by the process recommended by Decroisil, for measuring the strength of alkaline fluids, indicated from one and a half to two degrees of alkalinity. Hence any increase of alkaline strength above the last of these points, must be considered as owing to the intentional addition of carbonate of potass or soda. This is evidently the most difficult of the processes recommended for detecting the various adulterations specified in M. Barruel's paper. Indeed a chemist alone could conduct it. The others may be easily executed by any body.

CANADA THISTLES.

From the Genesee Farmer.

I have recently noticed in the Genesee Farmer several articles on the destruction of the Canada thistle; but none of them seem to reach the root of the evil. I am, however, pleased to see the public attention drawn to the subject.

The extermination of this pest of our plough fields, is an object of great importance to all farmers, who are unfortunate enough to have them on

their lands; and it is therefore, in a measure, incumbent on them to communicate to each other whatever methods they have taken for that purpose, and particularly such as have had the desired effect.

I have no expectation that this thistle is to be totally and entirely eradicated, and banished from the country, as it is a perennial plant, and is to be found on the road sides, in woods, and in all unoccupied lands, (at least in this vicinity.) All that can be done with such, if near at hand, is to cut them off and prevent their seeding. But being possessed of another manner of propagating themselves, more sure and certain, by their side or horizontal roots, which the cutting of the tops of the plant does not effect or check; they therefore must be permitted to remain, in such places, by a sort of compromise, that they are to be prevented from scattering their seeds on to our plough fields, from which I am confident they may be expelled, and after which, easily kept out; any further than this I shall not attempt doing or advise others to do.

Some enactments of the legislature, as recommended in the Farmer, would undoubtedly be of use. Such as obliging the owners of land (at least such as is under improvement,) to cut them at the proper time—imposing a penalty for neglect—and making it the duty of overseers of highways to have this done on the margin of roads. It would likewise have the effect of calling the public attention to the thing, and spread the alarm.

In articles of this sort, intended to guide the operations of others, unless one goes somewhat into detail, the object is in a measure lost; for those (if any there should be) who may be induced to adopt the method recommended, will have a wish to know all the particulars of the process before they commence. I shall therefore be compelled to make this of greater length than I supposed at first setting out would be necessary. What is here stated, however, is all from my own knowledge; nothing is given on hearsay.

When I purchased the farm which I now occupy, about thirty years ago, excepting some meadow lands, near a river, and some other small pieces, there were little or no improvements on it; being thrown out to commons, and mostly covered with small sapling wood and bushes—or as my Dutch neighbors expressed it, "*it had run out to bush.*" In open spots in this *bush*, the Canada thistle was sprinkled pretty liberally; and after clearing and ploughing they began to spread to an alarming extent, and threatened to overrun the whole premises. This first led me (but not in time by many years) to adopt some method more effectual than cutting off the tops to stop their progress.

It is well known to all farmers as well as botanists, that the roots of no tree or plant, whether annual, biennial, or perennial, can long survive, if prevented from vegetating, and coming up to the light of day. My theory was based on this principle. I commenced operations about eight years ago, on some small patches in a field planted with corn, as soon as any thistles appeared after planting, cutting them off twice a week at first; and was very particular never to have it neglected. It would take but a few moments to go over a patch two or three rods square, with a hoe; at the same time being very careful to leave none; and to be sure of this I generally went over the ground,

row by row, a second time. The deeper they are cut off with the corner of the hoe, the longer time of course it will require the new shoots to reach the surface again. I followed them up in this way, and about the middle of August they began to come up thin and scattering, and appeared of a sickly, yellowish hue. This was encouraging, and we continued the operation, (though I found it was not necessary to look to them quite as often as at first,) to about the first of October, or until no more appeared, and none have since shown themselves on these spots.

By digging down to the main roots in August or September, they were found in a state of decay, being of a blackish color. The result of this first attempt, is already given; but I will give something more of the details of the operation. That there should be no difficulty in finding the several patches when the corn had attained its full height, I placed high poles at each spot so that they could be seen over the tops of the corn, and kept a hoe on the ground to be ready at hand whenever I happened, in walking over my premises, to take them in my way, and cut them off if any were to be seen. In this way, but little time was spent; in fact none worth noticing. And as early as the first of October, as before observed, they were completely conquered. I ascribe the early season at which these patches were subdued, to their being allowed no breathing spell, and no omission being made through the season of operation, of cutting them off as fast as they appeared.

I have sometimes in lieu of, or rather for the want of a hoe, used a piece of hard wood, flattened to two or three inches wide at one end, and sharpened; or what is still better, a piece of iron or steel, like a chisel, fastened to the end of a stick or walking cane. It is proper to have some kind of tool in hand, or at the spot, otherwise some might escape, when one was accidentally passing near them.

Although the actual labor and time spent to destroy thistles in this way, is but trifling, at least in small patches; still it requires considerable patience and much diligence, that the thing may never on any account be neglected during the season of their growth; and I would caution all such as may have an inclination to try the experiment, that unless they are fully determined to persevere, and have full confidence that they can do it for at least four months, not to attempt it; because by any neglect during the season, the previous time spent, is in part lost; as by allowing the plants a breathing spell in the sun and air, new life and vigor is communicated to the roots, which is the thing intended to be destroyed.

As an evidence of this, in the season of 1828, I undertook to kill the thistles on a field of about fifteen acres planted with corn; and on which there were nearly twenty patches. Having placed the poles as before, I began cutting them as soon as any appeared after planting. They were followed up without any neglect, and as fast as they appeared, until about the 20th of August, when they appeared nearly subdued, or in a fair way for it, beginning to come up scattering and yellow. At this time I was called away on a journey, and was absent nearly four weeks, leaving strict injunctions on my men not to neglect the thistles in my absence. How far they attended to it, I cannot say, for immediately on my return, I was

taken sick, and was confined until after corn harvest. The thistles of course were forgotten. To make the matter still worse, the ground instead of being planted again as it should have been, was sown with barley and peas, and in September following with wheat, and the next spring stocked with clover for pasture. The same patches of thistles having revived, began to show themselves on the barley and peas, but being few in number and scattering, no attention was paid them. They have since continued to increase and spread by their horizontal roots, so that there is nearly or quite as many on the field as at first; although they have been regularly mowed off every year, and sometimes a second time, and have not seeded. This failure was evidently owing to the business not being attended to as it should have been the latter part of the season; but might have been remedied had the ground been planted with corn the second year, and which I shall do soon, and hope to avoid a like neglect, by which our labor in experimenting this season was lost.

The season of 1830, I planted another field with corn of about the same size of the last mentioned. There were on this field a number of patches of the thistle, some of them large, say over half an acre, some small. It was calculated that altogether they would have covered two and a half acres of ground. Having as usual marked the spots with poles stuck in the ground, we commenced cutting them at the proper time. The labor required on this field was more than on any I had yet taken in hand—the patches being large, and the thistles thick and strong. At first, and while vegetation was quick and rapid, the labor to go over them was equal to two men a day; but in a short time one man would do it in the same time, and towards the close of summer in three or four hours. Some of these patches were obstinate, so that we were obliged to follow them up into October; others gave up sooner. On the whole, they were totally destroyed. None escaped, and none are now to be found in any part of the field that has been ploughed. Although we succeeded in destroying the thistle on this field the first year, I should advise, where killing them is the great object, to plant with corn two years in succession, (although this in other cases might be bad management,) that should any thistles escape the first, they may be finished the second year.

I cannot state the expense of this experiment, as I kept no memorandum; but should think it would amount to not more than twenty dollars, if men had been hired for that express work; but as it was done mostly by boys, with myself, or some careful hand to overlook, I paid out nothing extra for labor that season on account of this job, and there was no neglect of other farming operations. But twenty or even forty dollars, would be nothing compared with the object attained, by clearing a good plough field of this nuisance. Had they been left to their natural course, they would in a few years by the running of their horizontal roots, and scattering with the plough and harrow, have spread over the whole field and ruined it for tillage.

The last season I planted with corn a small piece of about four and a half acres, much infested with thistles. It was planted with the express view of killing them—they were spread over a great part of the ground, but were small, the land having lain in pasture twelve years without plough-

ing, and had become what is termed sward-bound, which checks the growth, although it does not kill the thistle. The same course was pursued as in former years, and the business was well and regularly attended to. But few appeared after the first of September, but they were not neglected as long as one was to be found. I think they are all destroyed; but to make the thing doubly sure, I intend to have it planted next season.

A small piece at one end of this ground was planted with potatoes, on which I had never noticed any thistles. They however made their appearance, and were cut off with the rest. But when the tops of the potatoes began to fall on and cover the ground, it was with difficulty that the thistles could be found, and probably enough has escaped to keep the roots alive, and more or less will make their appearance another year. I therefore would advise never to plant potatoes where, and when, the great object is to destroy the thistle. On another account, I consider corn much the best crop to plant with this view. The roots of this plant, if it grows strong, run through and fill the ground with small fibres, which has a tendency to keep the ground dry and hard; at the same time the tops form a shade, and altogether seem to have the effect of checking the growth of the thistle, and aid in the operation of destroying it.

To prevent the necessity of going over the ground as often as was required with the hoe, I last spring had made some iron tools not unlike a small light crowbar, flattened at the lower end to about a hand's breadth and length, and steeled. With this tool, in soft mellow ground, the thistle may be taken up to the depth of six to twelve inches; but the process is much slower, and perhaps the time employed in killing them in this way, although the operation is not so often to be performed, is equal to doing it with a hoe, with which the ground is much quicker gone over.

The horizontal root of this plant, so often mentioned as its principal instrument of propagation, will be found at various depths, according to soil. In lands under the plough, and in other rich mellow ground, they push themselves along, in every direction from the main patch, and at every few inches send up a branch to the surface. On carefully uncovering a space several feet square, I have found them in a matter connected and tied together with this root. Whenever they can be taken up below the horizontal root, they are mostly destroyed with once going over, and with the iron tool before described, this is frequently done; and where there may be a very small patch in a distant field, the inconvenience of looking to it as often as would be necessary with a hoe, might be avoided by taking this course. In wet rainy seasons, like the last two, I find they spread themselves much faster than in dry ones. The ground being soft, and the roots strong and vigorous, and meeting less resistance, they will push along a considerable distance in one summer.

About nine years since, I had made a string of half stone fence, with posts, and boards on top. The ground on which the wall was placed, was rich bottom, and was set there to withstand the spring floods. It was made on the line of one of my neighbor's land, on which at a small distance was a large patch of Canada thistles. In a short time they pushed along and reached the wall, and have run along in, and under it, more than thirty rods,

or fifteen each way, in about seven years. Having heard that salt and strong brine would kill them, I procured, three years ago, a quantity taken from fish barrels, and taking off the top stones of the wall so as to come nearer the roots, the brine and salt was put on very bountifully. It had the effect of killing the tops of the thistles, and wilted them down; but the next summer they came up through the wall as thrifty as before. I see no remedy in a case like this, but to remove the wall, otherwise they will travel to each end of it, and from this lodgment spread over the adjoining field. And I have no doubt, that if a strip of rich, mellow land, reaching a distance of twenty miles, could be had, unobstructed by rivers, swamps, &c. a low stone wall placed thereon, and a family of thistles set a going at one end, but that they would in course of time, reach the other, and without the agency of any seed.

On my mowing and pasture lands, such as are wet and never ploughed, there are some patches of the thistle; which have for twenty-five years past remained nearly stationary. They are always mowed off in July, before the seed is ripe, and if necessary a second time to prevent their seeding. In this kind of hard sward land, they are small and puny, and comparatively give but small trouble and annoyance.

Whenever we have succeeded in expelling the thistle from our tillage lands, which is the extent of my expectations, in respect to my own, and all that I would at present advise others to attempt doing, they may, I am confident, with little care and no expense, be easily kept off afterwards. The seedling thistle is very small, and as easily destroyed as a pigweed, should they happen to be observed. It requires several years for them to form any considerable patch—their greatest security is their not being noticed, until by their side or horizontal roots they have run out in different directions. Small patches may be killed by a deep covering of any thing that will keep them under, and prevent them from shooting up to the surface. This I have done with pomace put on to some very small bunches near my cider mill. Salting cattle and sheep often on small pieces, will have the like effect; but this must be done very often, and through the season of growing. The salt itself does not have the effect of destroying the roots, because it cannot reach them, but the frequent licking of the spot by the cattle takes off the shoots as fast as they come above the ground, which is the same in its effects, as hoeing them off. All these methods, however, cannot be practised except on a very small scale.

I know of no plant or bush, with which the Canada thistle so nearly compares in its habits and modes of propagation, as the common elder. This, like the thistle, has its seed, and its horizontal roots with which to form patches; and like it, also, in not being to be destroyed by cutting off the tops once, or even twice a year, but must be rooted out. The same treatment which kills the thistle would have the like effect on the elder; but this would be attended with too much trouble, for the small number usually on our farms,—the better way, therefore, is to dig and root them out at once. But I think it is as great an absurdity for a farmer to say that he will not attempt to destroy the clumps of elder on his mowing land, because his neighbor lets them alone to seed, as to refuse to kill the thistle

on his plough land for the like cause. Since in either case, when they are once eradicated, they are easily kept out, let his neighbor's practice be what it may.

In my various experiments, I have tested this method of destroying the thistle sufficiently to convince myself at least, that it is very practicable, and attended with but little expense, if pursued with due care and perseverance. If no failures had happened in my several and yearly attempts, another year would have completed the routine of my ploughing fields, but it will now take three—and as I am less than that, from three score and ten, and have a wish to complete what I have undertaken, I must be careful to avoid the like errors in future. I close this long article with the hope that it may be of use, by inducing some of my brother farmers, who have a good stock of resolution and perseverance, and a plenty of Canada thistles on their land, to try the experiment, at first, if they please, on a small scale. I shall be pleased to be informed of the results, and particularly of their success. In the interim, I would inform them that I have allotted and set off for the ensuing year, a pretty large job of the same sort. The ground on two fields being already once ploughed for corn, on which there are patches of thistles in plenty, enough to cover three and a half or four acres, of which, provided my health is spared, I hope to be able to give a good account at the close of another year.

A SUBSCRIBER.

Note.—I would add one more remark, that no grass or weeds of any kind, must be permitted to grow on the spots or patches during the season of the operation, as they conceal the thistle sprouts, which may consequently escape the hoe. I have usually, on the spots where the thistles were thick and intermixed with weeds, hoed the ground well all over, as often as was necessary to destroy the weeds, and at the same time the thistle was taken off also.

TABLE

Showing the velocity of the wind in different circumstances.

Miles per hour.	Feet per second.	Perpendicular force on square feet, in averdupois pounds and parts.
1	1.47	.005
2	2.93	.020
3	4. 4	.044
4	5.87	.079
5	7.33	.128
10	14.67	.492
15	22.	1.107
20	29.34	1.968
25	36.67	3.075
30	44.01	4.429
35	51.34	6.027
40	58.68	7.873
45	66.01	9.963
50	73.35	12.300
60	88.02	17.715
80	117.36	31.490
100	146.7	49,200

hardly perceptible—
just perceptible.
gently pleasant.
pleasantly brisk.
very brisk.
high wind,
very high wind.
storm or tempest.
great storm.
hurricane.
hurricane that tears up trees and carries buildings before it.

PLAIN DIRECTIONS FOR ANALYZING GYPSUM.

For the Farmers' Register.

It is not quite so easy to analyze gypsum, and ascertain the precise proportions of any foreign admixtures, as may be done with marl. Still it is not difficult, nor very troublesome, to go through such a process as will enable any farmer to avoid being deceived by any adulteration of gypsum offered for sale. In the pulverized state, as prepared for manure, it is impossible to detect the grossest and most injurious fraud, by merely the appearance or taste, or by handling the article. If chalk, and very white clay, (such as forms some of the subsoils in Nelson county) were used to make half the weight of what is sold for gypsum, it would scarcely be detected—and many farmers might be cheated with a mixture containing not even the smallest proportion of gypsum. I know not whether such frauds are attempted—(and the character of the mills in Virginia is enough to guarantee the purity of *their* ground gypsum—) but if attempted, there is nothing whatever to prevent their succeeding, unless chemical tests are employed for detection. The inspectors of gypsum appointed by law, who, it is to be presumed, judge altogether by the appearance, and other sensible qualities, are no safeguard against deception: and this particular branch of the inspection system, is even more useless, more deceptious, and operating more as a cheat upon the community, than the inspection of any other commodity whatever. I mean not to reflect on any individuals by these remarks: the fault is in the system, and not in the persons appointed to carry it into operation. But this is wandering from my subject.

Not being entitled to be considered either an operative or scientific chemist, I do not know whether a more correct and convenient method of analysis may not be practiced than mine; and there may exist in this, causes to produce inaccurate results, which my ignorance has prevented my discovering. If so, I hope some other person will point out my mistakes.

Gypsum (sulphate of lime) is composed of certain proportions of sulphuric acid, lime, and water, chemically combined. Some small admixtures of metal, &c. which always accompany the gypsum of commerce, are too inconsiderable to affect the value materially, or to be ascertained by the process which will now be directed. Considerable admixtures of substances which could deceive the purchaser of ground gypsum, must be of clay, or chalk. If sand, or silicious earth was contained in gypsum, it would be evident enough to the teeth of the examiner.

1. Let a certain quantity, say 100 grains, of gypsum of commerce be pounded finely, when quite dry, and then tried with muriatic acid, in the manner directed page 609, No. 10, of the Farmers' Register, for analyzing marl. Pure gypsum will not show any effervescence, or other effect, from the application of muriatic acid. But if there is any effervescence, it proceeds from the presence of chalk, or *carbonate of lime*, in some other form: and the proportion of this substance must be ascertained by the directions given in the paper just referred to.

2. Then put into a glass another portion of the same article, say 25 grains, (finely pounded and

sifted through muslin, before being weighed,) and pour to it a saturated (or very strong) solution of *carbonate of potash* (which the apothecaries sell under the name of the *super carbonate*.) The two compounds thus placed in contact, *sulphate of lime* and *carbonate of potash*, will decompose each other, and exchange principles in this manner: the sulphuric acid of the first, will leave the lime and combine with the potash of the solution—and the lime will combine with the carbonic acid let loose from the potash: or rather with a part of it—for the lime cannot hold as much carbonic acid as the potash lets go, and the surplus escapes into the air with slow but continued effervescence, which lasts as long as the process is going on.

3. When the effervescence ceases, (which may take some hours, and plenty of time should be allowed,) the chemical qualities of the mixture are totally changed. There no longer remains a particle of sulphate of lime, nor of carbonate of potash, (except the *excess* of the latter, which having nothing to operate on, remains unchanged.) Instead of these, there has been formed the *sulphate of potash*, and the *carbonate of lime*—the former being dissolved in the fluid, and the latter in a solid form at the bottom of the glass. The appearance of the mixture is not perceptibly changed.

4. Pour off the clear fluid, and then add diluted muriatic acid slowly to the solid matter, which (if the gypsum was pure) will dissolve all that is solid (then carbonate of lime) with effervescence. If there was either clay or sand with the gypsum, they will remain at the bottom, after the action of the acid has ceased (as before described in the analysis of marl,) and may be separated by the filtering paper, and after being washed and dried, their weight will show the proportion of such impurities.

Whatever small metallic proportion may be in gypsum, will be dissolved by the acid, and not show in the result (as it should do,) as a part of the impurities. With this small exception, all the remainder of the matter dissolved may be considered as carbonate of lime, and which had been at first sulphate of lime, or pure gypsum, after deducting as much as was dissolved in the first step of the process.

Supposing then that 10 grains of the 100 had been dissolved by the muriatic acid, in the first trial—and that 7 per cent. of solid matter remained after the last, the proportions might be stated as follows:

100 grains of gypsum of commerce consisted of			
Carbonate of lime,	-	-	10 grains.
Clay and sand,	-	-	7 "
Pure gypsum,	-	-	83 "
			100

The foregoing proportions would mark very impure, if not adulterated gypsum—though it is not more impure than some I recently tried which was ground at the north. A specimen of the gypsum ground at Haxall's mill in Richmond, contained one per cent. of carbonate of lime only—which very small proportion may perhaps generally accompany the rock, or it might have been an accidental admixture, caused by lime having been landed on the same wharf.

E. R.

JARDIN DES PLANTES.

The *Jardin des Plantes*, at Paris, dates its origin from the beginning of the seventeenth century; but, as a school of botany and vegetable culture, was made what it is by the late Prof. Thouin, during the first years of the consulship. Speaking with reference only to what concerns plants and their culture, this garden is unquestionably the first establishment of the kind in Europe. We have in Britain several botanic gardens, but none maintained for the same objects as that of Paris. These objects are two: first, to collect useful or remarkable plants from every part of the world, and to distribute them to every part of France, and, as far as practicable, to every other country; and secondly, to form a perpetual school of botany and vegetable culture. Plants are brought to the Paris garden from all countries, by a universal correspondence, by particular naturalists sent out at the expense of the nation, and by the general protection and favor of government to the objects of science and the pursuits of scientific men. Objects of natural history destined for the Paris garden, in whatever description of vessels they may arrive in a French port, pay no entrance duty, and they are mostly forwarded by government conveyances to Paris free of expense. Every warlike, exploring, or commercial expedition is accompanied by naturalists officially appointed or voluntarily admitted, to whom every facility is afforded in the objects of their pursuit. Plants received in the Paris garden are propagated without loss of time, and distributed in the first place, to all the botanic gardens of France, of which there is at least one in the capital of every department; next, seeds or plants are sent to such of the colonies as it is supposed may profit most from them; and, lastly, they are sent to foreign correspondents, in proportion to similar favors received, or returns expected. The departmental botanic gardens propagate with all rapidity the plants received from the central garden, and distribute them among the eminent proprietors and cultivators of the department. This, at all events, is remarkably good in theory. Botany is taught by the lectures, demonstrations, and herborisations of a professor, and illustrated by an exemplification of 124 orders of the Jussieuan system in living plants. A considerable number of these plants are necessarily exotic, and kept under glass during winter; but, in May, before the demonstrations begin, they are brought out in the pots, and sunk in the earth in their proper places in the systematic arrangement, with their names and the names of the orders to which they belong placed beside them. The cultivation of vegetables, and all the different operations of agriculture and gardening, are taught by another professor, with assistants, and exemplified by different compartments in the garden. For instance, there is one compartment in which all the different operations on plants and on the soil are exemplified, from the different modes of preparing the soil for sowing or planting, through all the species and varieties of propagation, training, and pruning, even to hedge-growing and fence-making; another compartment contains all the plants of field culture; another all the medicinal plants; another all the principal timber trees; another, as far as practicable, all the fruit trees. Specimens of the different implements are kept in

one building, and of the principal soils, manures, and composts in an appropriate enclosure; and so on. The essence of the lectures, accompanied by figures of such of the implements and operations as admit of representation by lines, will be found in *Thouin's Cours de Culture et de Naturalisation des Vegetaux*, by Oscar Leclerc, three vols. 8vo., with one quarto volume of plates; and a complete description of the garden is given in the well known work of Royer.—*Gard. (Eng.) Mag.*

TO DESTROY VERMIN ON PLANTS.

By a correspondent of the Gardeners' Magazine.

In all the recipes for destroying *Acari* which I have seen, sulphur is an ingredient; this, in its crude state, will not unite with the liquids used for that purpose, and therefore it can have little or no effect, except when applied as a wash on the heated flues of a house. In order to make it unite with soap suds, tobacco water, and other liquids usually made use of for destroying insects, it must be converted into a sulphuret, by boiling it with lime or an alkaline salt, as in the following mixture, which expeditiously and effectually destroys the red spider, by merely immersing the plant, or part infested, in the mixture:—Common soft soap half an ounce, sulphuret of lime* one ounce by measure (or two table spoonfuls,) soft water (hot) one ale quart. The soap and sulphuret to be first well mixed with an iron or wooden spoon, in the same manner as a mixture of egg and oil is made for a salad; the hot water is then to be added by degrees, stirring the mixture well with a painter's brush, as in making a lather, by which means a uniform fluid will be obtained, like whey, without any sediment, which may be used as soon as it is cool enough to bear the hand in it. This mixture will destroy every insect usually found in the greenhouse, by mere immersion, except the Coccus, or scaly insect, which adheres so closely to the stem, or under side of the leaf, that the mixture cannot reach its vulnerable parts; therefore, in this case, the mixture must be applied with a brush that will dislodge the insect. If the mixture be put into a wooden bowl, or any other shallow vessel, small plants in pots, and the leaves and branches of larger ones, and of fruit trees, may be easily immersed in it by pressing them down with the hand. The above mixture will not destroy the black Aphides of the cherry tree, nor the green Aphides of the plum tree, by immersing the leaves and branches in it; there being an oiliness on these insects which prevents its adhering to them. It will destroy them by applying it with a brush: but this is too tedious a process. It has been recommended, by writers on horticulture, to wash these and other fruit trees against walls, before the leaves and buds appear, with mixtures which cannot be safely applied after; for which purpose the above

* The sulphuret of lime is easily made in the following manner:—Take of flour of sulphur one ounce; fresh lime, finely sifted, two ounces; soft water a quart, boil the mixture in an iron vessel about a quarter of an hour, frequently stirring it after it begins to boil; let it stand to settle, and pour off the clear liquor. If it is not used on the same day, it must be put into a bottle filled with it, and be well corked; for, if it be exposed to the air, it will soon attract oxygen, and will then curdle the soap, and smear the plants with a white substance, which is not easily washed off.

mixture, with the addition of spirits of turpentine, is likely to succeed as well as any other, or better: but I have not yet had an opportunity of giving it a trial. Half an ounce, by measure, of spirits of turpentine being first well mixed with the soap, and the sulphuret and water added as before; or the wash may be made stronger, by adding twice the quantity of each ingredient to the same quantity of water. For destroying slugs and worms there is no recipe so simple, attended with so little trouble, and, when properly applied, so effectual, as common lime-water. The plants on which the slugs are found must be watered with it twice at least, at an interval of three or four minutes. If you place three or four slugs on the ground, and pour lime-water on them from a watering pan, you will soon perceive them throwing off a kind of slough, and after that crawling away; but if you sprinkle them again with the lime-water, they will not be able to throw off another slough, and soon die after the second operation. When a person has therefore watered as many plants as takes up the time of three or four minutes, he must turn back to the place where he began, and water them again. Lime-water, for this purpose, may be easily made so as to be always ready. Into a trough, containing about fifty-five gallons of water, throw in two or three shovelfuls of lime, stir it up three or four times on that day, and the next day the liquor is clear and fit for use and will continue to answer the purpose for some time, without adding any fresh lime, by stirring it up again before it is used, and letting it settle. If the lime-water be of sufficient strength, it will destroy the large grey snail with twice watering, and all worms that are out of the ground at the time of watering, and it will not injure the most tender plant when used in a clear state.

THE CASTLE HOWARD OX.

From the British Farmers' Magazine.

This most wonderful specimen of the short-horned breed was lately exhibited in York, and excited the astonishment and admiration of crowds of persons who went to see it. Its color is white—stands about seventeen hands high—measures three feet four inches across the loins—and weighs upwards of 260 stone.

ON REAPING WHEAT BEFORE THE GRAIN IS HARD.

For the Farmers' Register.

There have been published at different times various and opposite facts and opinions with regard to the propriety of reaping wheat before the grain is hard. In the agricultural journals both of Europe and the United States, reaping green has been announced by different persons as an important discovery, and as if the practice was altogether new to the reporter and to his readers in general. To meet these statements, there have been others presented, of experiments conducted apparently with much care and accuracy, of the comparative value of grain reaped ripe and green, and the results of which showed a certain loss in the latter practice. Each of these various statements, so far as I know, stands alone, and is not

compared, or considered in connexion with others which are apparently in contradiction. This deficiency it is my object to supply, in addition to offering the results of my own practice in this respect. The subject, in my opinion, presents one of those cases in which both sides of the question are true, though each may appear erroneous to those who will not compare the opposite views, and take into consideration all the circumstances which operate, or may be expected to operate, during the time of reaping. It may be true, (and I readily admit it as true,) that a head of wheat permitted to become perfectly mature on its stalk in fine weather, will furnish the greatest possible weight of grain, and of the best quality, to be derived from the particular growth of wheat: and that another taken off in a soft and green state, probably loses something, in quantity, or quality, or both, and cannot possibly gain in either of those respects. This is the amount of the results shown by the experiments referred to above, even if it is conceded, (though very doubtful,) that the manner of making such comparative experiments was perfectly correct. But though there may be no gain from reaping green in fine weather, and even some small loss of product, yet fine weather we almost never have through harvest—and it will be better to lose five per cent. by reaping green (admitting such a loss to be certain,) than to save it by maturing, and then to lose far more from bad weather occurring while the wheat is standing in the field. This, I think, is the proper view of the subject, and the proper mode of instituting a comparison of the products. If we could be sure of having dry weather, I entertain no doubt of the propriety and economy of not reaping until both grain and straw are ripe. But with the strong probability of more or less of rain—and the possibility of a long spell of it—I am as sure that a great saving will be found in reaping wheat as early as the state of the grain will permit. What that state is, has not been described very particularly, in any of the publications I have read; and it is not unlikely that the uncertainty on this head has caused some of the differences of opinion as to the propriety of the practice in general. I consider wheat fit for the scythe when the grain is in the *dough state*—no matter how soft, provided it is clear of milk, or when no fluid comes out separate from the dough, when the grain is mashed between the fingers. But no one square yard of wheat can be found, in which all the heads have reached this state at one time: and, therefore, when not more than one-tenth part of the grains contain milk, I think it safe to begin to reap. There will be some loss in the quantity of all the milky grains, (though no injury to the quality of the sample in general,) but less than would be usually found by waiting long enough for every grain to be free of milk. If the Mountain Purple Straw is the kind made (which has generally formed the greater part or the whole of my crop) it may be easily known by the purple tinge on the stalk, when the grain has reached the dough state.

As I place the advantage of reaping green on the greater certainty of avoiding the effects of bad weather, it may be inferred that the experience of several years would be required to make a correct decision. I began this practice in 1821, and have never since failed to begin harvest as soon as enough wheat was fully in the dough

state, except in those years, when the pressure of other farm business made it necessary to let the wheat wait some days longer. If, therefore, this opinion is held by me improperly, it is not for want of experience, but for want of judgment.

The universal practice in my neighborhood before 1821, was to wait for the grain to be hard; and if there was any doubt of the straw being perfectly sapless and dry, the wheat was left on the ground, without binding, for one or two days, to be dry enough to stack. My green reaping, when first commenced, was fully nine days earlier than was usual—and it was pronounced then that I was destroying my crop, by reaping it so green. My practice is still condemned by many, who, however, have gradually and perhaps unconsciously, advanced the commencements of their harvests, until they are not more than two or three days behind mine.

The first year of my early reaping was most fortunately chosen. After weather generally fine until the latter part of June, there began the longest spell of rainy weather that I ever knew at that time of the year. The rain fell more or less for seven days in succession, without enough sunshine (if any) during the time to dry the wheat at any one time. I did not keep a farm journal that year, as was my general practice, but noted these circumstances before the next harvest, while they were fresh in my memory. I did not there state, and do not remember, the date of the beginning of my reaping in 1821; but the whole was finished, and the last reaped was shocked, just before the long spell of rain began. It had rained gently one day only during my harvest; and a piece of thin wheat, of about 25 acres, had been cut down on that day, and still remained open on the ground. So much of this had sprouted before the rains ceased, and so much on the tops of the shocks throughout the crop, that I estimated my loss at one-tenth of the whole. But that loss was small indeed compared to that of my neighbors, and of lower Virginia generally. Some had not begun to reap—but few had been as many as three days in harvest, when the spell of rain commenced—and scarcely any wheat had been put up in shocks, or secured otherwise. The wheat left standing was so bent down, as not to be tolerably saved, besides being greatly damaged in quality; and what was on the ground was mostly sprouted. My notes state as the supposed estimate of general loss through our part of the country, from one-half to two-thirds of the crop. Some good managers, and many bad ones, did not make as much wheat as they had sowed, and that of such bad quality, as to be unfit to sow again. Indeed the destruction of wheat was so general, and so little was left good enough for seed, that it caused many who were before hesitating about such a change of crops on light soils, to abandon wheat entirely, and take cotton instead, as their principal crop for market.

The saving made that year by early reaping was enough to pay for all the loss to be incurred by that plan in twenty years: and though such a spell of weather may not occur in a long life, there is scarcely any year in which more or less is not lost by rain compelling wheat to stand (or to lie,) too long in the field. When rain stops the reaping of green wheat for three or four days, the farmer is left just where he would have been with-

out the rain, if he had waited to reap ripe. But to him whose wheat was dead ripe, having his reaping suspended for a few days is a most serious damage. Even if no grain is actually sprouted, every wetting and drying after it is ripe, is injurious to its quality. Besides this, no field can be reaped as easily, and as effectually, after as before rain. Heavy wheat is lodged, and sometimes lost completely: and the stalks on the lightest and poorest land bend in curves, and in every direction, so as to render it impossible to be saved well when reaped.

Now to consider the objections to reaping green. I have admitted that there must be a loss, from shrinking, in every grain having any of the milk remaining, and a general loss on the whole crop, on the supposition that a proportion will be in the milky state. But, (though it would be difficult to test it by fair experiment,) I do not believe that any thing is lost in either the weight or bulk of grain cut in the dough state. There is loss of labor however, (that is, if the weather continues dry,) and there is risk of loss, from putting the sheaves into shocks or stacks before their being perfectly cured. Green wheat may be made up into small sheaves, (the band being a single length of the straw,) as fast as it is cut down: but the straw will shrink so much on drying, that the bands will be apt to become loose, and many of the sheaves to fall to pieces. If the binders are kept half a day behind the reapers, that objection will be obviated: but others will be presented in the loss of labor when the reapers and binders are thus separated, and the exposure of a greater quantity of wheat, after its being reaped, to rain. But it should also be considered, that green wheat is less hurt when caught by rain, than the perfectly ripe would be.

If the wheat is sheaved when too green to put into shocks, it should be put up in "stooks" of about six sheaves each, by setting the stubble ends of the sheaves far enough apart to give sufficient base, and letting the heads of all the sheaves lean together so as to form a point. These stooks are easily made, will throw off a light rain, and will dry as they stand, if made wet by heavy rain. I have had such stooks to be wet and dry repeatedly before the wheat could be put into shocks—without any more injury than would have been sustained if the wheat had been standing. But this was of the purple straw kind. Before I knew the difference, I permitted some white wheat to go through the same treatment, and found much of it sprouted by rain in the stooks.

As to the quality of the grain, for making flour, I believe it is generally conceded that the wheat reaped green is best.

What is the extent of the gradual advancement of the usual time of reaping, I cannot state, though aided by written memoranda of my own farm business for most of the years of the last twenty. Many of those who have never noted such things, are not aware that they now venture to reap in a state of greenness which they would have thought very hazardous formerly. I remember well that fifteen years ago, our festival of the 4th of July always came in harvest, and that no one finished reaping before that time, unless he had sowed early wheat, and had a very small crop. In 1819, I began to reap on June 23d, (golden chaff wheat,) and the entry on the journal of that day states that the grain was

not quite hard. I suppose that time to have been as early as any one would have ventured then. The following are all the dates of the commencement of my harvests, which were recorded before my change of practice, and for some years afterwards.

1818—June 25th.
 1819— " 23rd.
 1822— " 8th.
 1823— " 13th.
 1824— " 11th.
 1825— " 10th.
 1826— " 12th.—and might have been begun 5 days sooner, if the state of other crops had permitted.
 1827— " 16th.—the ripening stated to have been made unusually late, by the depredations of Hessian Fly, added to a cold season.

1828— " 12th.
 1829— " 19th.—the beginning having been delayed two or three days by the pressure of other work.

The purple straw, and golden chaff wheats, were the kinds sowed.

There is so much difference in these dates, added to my recollection of our late harvests in general, formerly, that I am somewhat tempted to think that there has been an increase of average temperature, as well as of change of practice in reaping. But if that was the case, so important a fact could not have escaped the notice of the many curious and particular observers of the changes of temperature, as indicated by the thermometer.

E. R.

REMARKABLE HABITS OF THE AMERICAN LOCUST.

There is no longer any doubt that these singular insects are to make their usual periodical appearance the present season. They are already easily to be found, at the depth of six or seven inches, in gardens, and especially in orchards, under old trees. By skimming off the surface of the earth, thousands of holes are perceptible, where they have been penetrating to the surface, in order we presume, that their way may not be obstructed on their day of general resurrection. An old gentleman of this place, informs us that his father kept particular note of their appearance in four instances, and that he himself has followed it up, and preserved observations, also, in four instances—and that they have uniformly appeared every seventeen years; but what is singularly striking, that in all these eight instances, they were found to have a general resurrection day, which has regularly occurred on the 25th May. He further says, that two or three days previously, a few make their appearance, as a reconnoitering party; but on the 25th, the whole country is deluged with one interminable swarm.—*Germantown Tel.*

[If it is indeed true that there is so much regularity in the continuance of the dormant state of these insects, the time of their coming forth is not the same in different places. It was in 1829 that they appeared in prodigious numbers in this county, (Prince George,) where they had not been observed before within the recollection of any person whose opinions we heard

expressed. They were in much the greatest numbers in woodland where the soil was stiff and close: and in all such places, every tree was supplied with locusts in such numbers, that a traveller for miles together could perceive no cessation, or change in the loud but monotonous chorus kept up by their voices. These insects caused no injury. They were not much more than half as large as the common green and black locusts, (or *dry flies*, as vulgarly called,) which, in small numbers, appear here every summer. The color of the former was touched with a pale dingy red, instead of the green which the common locust has. The name applied to both these insects is doubtless incorrect, as both differ widely from the great plague of the earth in other regions, of which we are so fortunate as to know nothing in this country, except by report.

There is too much of the marvellous in the regularly returning visits of our locusts for the statement to be altogether credited, though it has been stated in several publications besides that quoted above. But at any rate, there must be enough in the habits of these insects, that is both true and strange, to excite curiosity, and invite attempts at investigation.]

HARDENING OF IRON.

From the Southern Planter.

Dr. Bartlett—It may be considered presumption in me to attempt to give directions to a blacksmith how to temper a tool when he has made it. If I cannot *teach* a blacksmith I can *tell* a farmer how to avoid imposition.—I have noticed for several years that ploughs made and tempered by some smiths would last twice as long as the same kind made by others—this is owing to the manner of tempering.—In tempering a plough, all that is necessary is to give it a thorough heating and cool it quick. In order to cool quick, it is necessary to have plenty of water, and that of a good quality.—To undertake to cool a plough that weighs 8 or 10 pounds in two or three gallons of water, is absurd; more especially if that water has been heated a great many times.

WM. H. BAIFORD

Henry co. May 5th, 1834.

BUTTER MAKING IN CHILE.

From *Waldie's Journal of Belles Lettres*.

In Chile, butter is packed in sheep skins, with the wool side out, and would be very good, in spite of appearances; were it not so much salted. The operation of churning is performed by a donque [an ass;] the cream is put into large gourd, or dry skins, placed on his back, and then the animal is kept trotting round the yard till the butter is made. In this art they seem not to have advanced a single step since its discovery; for we are told that a countryman somewhere lost a large jar of cream, by carrying it for some distance on a hard-trotting horse, which accident led to the important invention of churns and butter. A friend told me, that he had presented, some years ago, a Yankee churn to a family residing near the capital, and taught them to use it. So long as it was a novelty they were pleased, but at the end of a few weeks decided the donque made butter just as well and consequently threw it aside!

HORSE-TEAMS—FEEDING EXPENSES—LABOR.
 Extracts from the Farmers' Series of the Library of Useful Knowledge.

Animal labor is an object of the deepest importance, both to the public and to those individuals who employ it: to the former, inasmuch as the amount of food thus consumed is so much abstracted from the general means of subsistence; and to the latter, as the value of its employment consists in the proportion of its cost to its power. It is, therefore, in every point of view, desirable to economize it, so far as may be consistent with its efficient use, both through the saving of the labor and the feeding of the cattle by which it is performed; but to these considerations must be added a due regard both to the effectual performance of the work, and to the sufficient support of the animal. Less has been done for the farmer than for the manufacturer, in the improvement of machinery, and unless the power of the steam-engine should at some future period be applied to the plough, he must still be dependent for the production of his crops upon the labor of cattle, which absorbs so large a portion of his profits, that he cannot be too careful of this branch of his expenditure. In this, however, as in the regulation of manual labor, true economy lies more in duly apportioning the strength of the teams to the work to be performed, than in any mere saving of expense; and there is no part of a farmer's business that demands a sounder exercise of judgment than the selection and management of his working stock.

It is usually considered that one team, if well kept, is sufficient for the cultivation of from 40 to 50 acres of heavy land, and from 50 to 60 acres of lighter soil, under common rotations; but the strength of that team depends so much upon the breed and condition of the animals, as well as upon soil and culture, that this is subject to much variation. Some tenacious clays cannot be worked with less than four strong horses, or even more, on breaking them up; while a free loam may generally be managed with a pair and whip-reins; and a course of constant tillage necessarily requires a greater number of ploughs than when a large portion of the land is allowed to rest for some years under grass.* Teams should never be below the work to be executed: every such apparent saving will turn out a real loss to those who attempt it, and even a supernumerary horse, for cases of emergency, will seldom be found bad economy. The great point is neither to be above nor below the mark: no example need be adduced to show, that if too little power be employed, the work must be imperfectly done; and that if too much, a portion of it must be thrown away; nor, although working-cattle should not be pampered, is it necessary to prove the truth of the old saying, 'they won't pay for feeding, they won't pay for starving.'

*In the report of the Morvich and Culmailly farms (Farmers' Series, No. 18,) consisting of 650 acres of land, it is stated that the whole work is performed by seven pairs of horses, including one pair of mares in foal, and one pair of young horses, thrown off grass during summer: but the rotation on the greater part is,—1st turnips; 2d barley; 3d, 4th, and 5th, grass; 6th, oats: on the remainder, 1st rape and naked wheat; 2d wheat; 3d and 4th, grass; and 5th, oats; or any one-half in grass.

Regarding Horse Teams.

It is a just observation, 'that one can hardly be at a loss to determine the character of a farmer from the condition of his horses*.' Very fine, high-fed cattle, exhibiting the appearance of being prepared for sale, rather suggests the idea of idleness than of labor; but, on the other hand, lean, spiritless creatures, worn out by toil and hunger, are the certain indications of a bad farmer; of one not thriving and who does not deserve to thrive. The man who employs bad instruments cannot have his work well done, and one important and previous step towards good farming, is to keep the laboring stock in good condition. Horses regularly fed, and regularly wrought, will perform a great deal of work without falling off either in strength or appearance: it is, therefore, of great importance to distribute the labor as equally as possible through the various seasons of the year: and to take care that if, as must sometimes be the case, an extraordinary exertion is to be made, they are in the proper order to make it. When once allowed to fall off, it requires much more to restore them, than might have kept them in a good state.

The feeding of farm horses forms so material a part of the charges on agriculture, that the manner in which they can be cheapest maintained is a matter deserving the most serious attention. It is an established principle, that animal power can only be exerted in proportion to the quality, as well as the quantity, of the food with which it is sustained. In conformity with that rule, hay and oats, or beans, given in their natural state, were long considered as the only horse provender possessed of the requisite degree of nutriment, and in consequence of its cost, penurious farmers stunted their horses, or those of an opposite disposition, who 'indulge in the pride of teams,' were put to very great expense. Experience, however, has proved that substitutes may be used to a very considerable extent, without injury to the animal itself, or diminution of its strength; and that different modes of preparing its ordinary food may be adopted with advantage.

The vegetables most commonly resorted to as substitutes for corn and hay, are potatoes, turnips, carrots, parsnips, and mangel-wurzel, with straw, and the haulm of beans and peas. Among these the potato ranks foremost, both in quality and in being more commonly cultivated than either parsnips or carrots; but it is attended with the inconvenience of requiring to be boiled, or steamed, as its juice has been found prejudicial, and in some cases even fatal, to horses, when given raw, and both it and the yam, which has lately been much employed for the same purpose, are apt to ferment in the stomach, and occasion dangerous colic, when used in a crude state. Of turnips, the Swedish is the only one that can be recommended to be given alone, though the common kinds may be advantageously mixed with potatoes; but, when given in that manner, they should be boiled separately, in order to preserve their juice, which if not given to the horses, will be found serviceable for store cattle and pigs. Carrots are much relished by all cattle, and when combined with dry food, have a most perceptible effect upon the horse's coat, soon imparting to it that glossy appearance which is one of the best tests of condition, and

* E. Lothian Survey, p. 197.

consequently of health: they are also thought to improve the wind. Parsnips are still more nourishing, horses eat them greedily, but they soon clog the appetite; and, in the island of Jersey, where the root is used extensively for other purposes, it is never given to them, for it is alleged that, when kept on that food, their eyes are apt to suffer injury.* Mangel-wurzel, though inferior to these, is preferable to any turnips, except Swedes.† All these roots, except potatoes, and turnips when used along with them or other substances, as a mash, are generally given raw, and care should be taken, in slicing them, to cut the pieces sufficiently small to prevent them from sticking in the throat if swallowed whole; an accident from which serious consequences have ensued.

In most instances only one half of the usual allowance of corn has been given to horses thus fed, and they have notwithstanding gone through their customary labor with as much apparent ease, and have been maintained in as good condition as when kept in the ordinary way. In some cases, all the corn, and in others, all the hay, also, has been withheld, and numberless accounts have been published to prove that the work has still been equally well done. Some of these are subjoined, in order that every one may judge for himself of the degree of attention to which they are entitled. It must, however, be remarked, that although farm-horses may be kept in very fair condition, and their common field-labor may be performed, at some seasons, without corn, yet that hard work cannot be supported without high feeding, of which sound hay and oats, and old beans or peas must ever form the chief part; though, even then, a portion of roots will be found serviceable in keeping the bowels open and the body in a healthy state. The following are a few of the statements most to be relied on.

In the details of management on separate farms, already published in the 'Farmers' Series,' we find that, in one instance, horses, constantly worked throughout the winter, as long as there is daylight, are maintained in good condition upon about a peck of oats, given in three feeds, chiefly of light corn, the last of which is made into a mash with yellow turnips, bran, and chaff, steamed or boiled together on the previous day: turnips are also given raw, and the only rack-meat appears to be oat-straw.‡ In another, only one feed of oats is given, together with hay and bean-haulm, and Swedes, both raw and steamed; and it seems that some farmers substitute Swedish and yellow turnips wholly for corn, yet their cattle are said to be fresh and in good working order: but it is admitted in both these instances, that when there is much carting, oats are allowed according to the work, and the quantity is increased in the spring.§

The late Mr. Curwen, who tried more experiments than most men in the feeding of cattle, kept

nearly a hundred of his colliery and farm-horses during the winter upon equal quantities of straw and potatoes, steamed together, in lieu of hay; and found that some which were worked in the same manner, but fed with hay instead of potatoes, were not in equal condition with the others.* His mode of feeding, as detailed by the Carron company, who have adopted his plan is thus:—'They have three tubs steaming at a time: two of potatoes, and one of chopped straw, chaff, or dusting-seeds; they empty one tub of potatoes into a large mash-tub, by way of bottom layer; then the tub of chopped straw, and last, the remaining tub of potatoes: the whole is wrought up and mixed with a large wooden pestle; and to this they add a small quantity of salt. A bucket is brought for each horse with his feed of corn (bruised oats) in the bottom, and his proportion of the mash is filled in above; when it is emptied into the manger, the corn is of course uppermost, and the horse feeder puts his hand through to mix it.† They feed warm. The quantity of food, and calculation of expense, are as follows:—

Farm Horses.

	s.	d.
1½ stone of potatoes, at 3d.	0	4½
7lbs. of cut straw 1d. }	0	2
and cutting 1d. }	0	0½
Steaming - - - - -	0	1
7lbs. long straw - - - - -	0	8
8lbs. of oats - - - - -	1	4

Colliery Horses.

	s.	d.
8lbs. of hay and 8lbs. of straw cut }	0	5½
together }	0	1
Cutting - - - - -	0	1½
7lbs. of steamed potatoes - - - - -	0	2½
6lbs. of carrots - - - - -	1	0
12lbs. of oats - - - - -	1	10½

per horse, per day,

The potatoes are estimated at 50s. per ton, inclusive of the expense of steaming; oats at an average of about 3s. 4d. per bushel; hay at 2l. 12s. 6d., and straw at 15s. 6d. per load, exclusive of the cost of cutting.

After several years experience of the comparative merits of steamed potatoes and straw, or hay, Mr. Curwen gave a decided preference to the former, both as regards the saving of expense, its effects upon the health of the animal, and its power of upholding their condition; but notwithstanding the apparent candor of his testimony, and its being corroborated by many similar statements,‡ it is well known that, when much exertion is required, both hay and corn become necessary.

*Quayle's Survey of the Island on the Coast of Normandy, p. 103.

†Statements of the proportionate value of these and other articles of cattle food, will be found under their respective heads in future chapters.

‡No. 18, p. 70. §Ibid, p. 97. See also No. 12, p. 43.

N. B. One peck and a half of oats make four Scotch *tippees*, or feeds, as alluded to in these accounts; or one-half more than the quantity usually considered as a feed in England.

*Hints on the Economy of Feeding Stock, &c. &c. by J. C. Curwen, Esq. M. P.

†Communications to the Board of Agriculture, vol. v. No. 10, p. 210.

‡See the Farmers' Magazine, vol. xi. p. 334, and xiv. p. 229; and the Survey of Dumfriesshire, chap. xiv. p. 376. The latter account states the quantity given to be 42lbs. of potatoes and about 10lbs. of straw, without any oats, except when the horses are employed, on the road.

In Essex, we have the authority of Messrs. Vancouver and Arthur Young, who separately surveyed the county, that working horses have been kept through the winter entirely on *steamed potatoes*, to every 300lbs. of which there was added 'one' pint of salt, and occasionally a small portion of sulphur; and that, 'fed in this manner, they performed with the greatest ease *all the common labor of the farm*, without either hay or oats.'* The difference of the expense of a team of five, during half a year—calculating the potatoes as worth 40s. per ton, and hay and oats respectively at £3. the load, and 24s. per quarter, which nearly accords with the estimate of consumption in the survey, would stand thus:—

<i>Potatoes.</i>		£.	s.	d.
5 Horses 182 days, at 50 lbs. each,	}	36	0	0
45,000 lbs. † or 18 tons, at 40s.				
Washing and steaming at 2d. per	}	3	15	0
100lbs.				
3 Bushels of salt at 2s.	-	0	6	0
Sulphur - - - - -	-	0	2	6
		40	4	4(a)
<i>Hay and Oats.</i>		£.	s.	d.
5 Horses 182 days, at 24 lbs. each,	}	32	10	0
hay, 21,840 lbs. or 10 5-6 loads				
at £3				
Ditto 26 weeks, at 2 bushels each,	}	39	0	0
oats 32½ quarters at 24s.				
		£71	10	0
		40	4	4
Balance in favor of potatoes,		31	5	8

The cost would thus be a fraction more than 10½d per day, and the saving about six guineas for each horse in the winter half year, if they could be kept in that manner so long; but this mode of feeding cannot be commenced before November, nor continued after February, for, notwithstanding the assertion of the reporters, as well as of many other persons of veracity respecting the 'common labor of a farm,' during the depth of winter, it cannot be continued during the spring, upon land that is properly cultivated, without either an unusual number of horses, or an allowance of corn.† Upon this statement, it is also to be observed, that supposing the oats to weigh 35 lbs. per bushel, the daily allowance would then be 34 lbs. of hard meat, or 1s. 7d. per day, which is the highest estimate that can be admitted for a common-sized cart-horse, and would assuredly support him in better condition than any quantity

* Young's Survey of Essex, vol. 1, p. 398.

† The cwt. of potatoes is usually calculated to weigh 126 lbs. Then 126 by 20=2520 by 18=45360. V. Thaer calculates 1 cwt. of hay as equivalent to 3 bushels of potatoes: both, however, necessarily vary much in quality.

‡ A correspondent in the Farmers' Magazine, vol. ii. p. 217, recommends a mixture of 4 lbs. of boiled potatoes and 4 lbs. of bran, at each feed: adding, from six years' experience, that this method 'saved much corn, and gave his horses a very fine skin.' Were 2 lbs. of ground oil-cake substituted for the bran, it would form a far heartier feed, without much difference of cost.

(a) The error in this calculation is in the original. [Ed. Farm. Reg.]

of potatoes that he could consume. Were the allowances of corn and hay reduced in a fair proportion to the working value of the food, the cost would, therefore, be more equalized; but although experience may not justify the sanguine expectations of the advocates of leguminous plants, as horse-meat, to the full extent of their calculations, there can yet be no doubt that on light soils, and in situations which do not afford a market for field roots, they may be advantageously substituted for hay, and when the work is not severe, even for a considerable portion of corn.

Regarding *carrots*, we have also the evidence in their favor of Mr. Curwen, who substituted them for a portion of the usual allowance of corn, and has adduced a certificate from his groom and farrier, that "when from 8 lbs. to 12 lbs of oats are allowed to a work-horse per day, according to its employment, 4 lbs. may be deducted for 5 lbs. of carrots, and the spirit, condition, and ability of the horse to perform his work improved by the same:"* but the saving this effected amounted only to a shilling in the week. Other accounts state a bushel of carrots to be given daily instead of oats; and an Essex sportsman is mentioned, whose horses, thus fed, without any corn, follow a pack of harriers twice a week.†

In the Sandlings of Suffolk, horses are chiefly fed on carrots, with sometimes hay, and sometimes corn, and sometimes with only straw; viz:—

6 horses, 2 loads of 40 bushels per week, no corn, and a little hay.

Do. 1 load, with corn in the spring-time, and little hay.

Do. 72 bushels per week; no oats, and half the usual allowance of hay.

The horses are said to be in superior condition than when fed on oats; but this probably arises from their being allowed as much as they will eat, while oats are allowed.‡ In Surrey, also, where carrots are extensively cultivated, a team of four good horses gets about 60 bushels per week until Christmas, with plenty of sweet chaff, or clover hay, but no corn; and after that 40 bushels are given, with 2 bushels of oats, and a sufficiency of chaff.||

Common turnips scarcely merit notice as horse-food; but *Suedes* have been given in various instances, besides those already particularized, with evident advantage, both sliced in their raw state, and steamed; and as they are both more commonly cultivated and less expensive than most other roots, they are deserving of the superior attention of economists.

Steam.

The chief value of boiling, or *steaming the food of animals*, seems to consist in rendering it more easy of digestion, and thus, perhaps enabling them to retain a greater portion of its nutriment than

* Hints on the Economy of Feeding Stock, &c., p. 207.

† Berkshire Report, p. 228. Essex do., vol. ii., p. 6. In the communications to the Board of Agriculture, there is also an instance of farm-horses fully worked and fed entirely on carrots, instead of hay; but they get 70 lbs. each, sliced, along with chaff.—Vol. vii., art. ii., part 1.

‡ Suffolk Report, chap vii., p. 125—140.

|| Malcolm's Modern Husbandry of Surrey, Kent, and Sussex, p. 482.

when it is used in a crude state. For old horses especially, whose teeth being worn are incapable of effectually grinding the corn which their work may render necessary to their support, and whose powers of digestion are weakened by age, this is an incalculable advantage. Being softer than dry food, it is besides more readily consumed, and consequently allows more time for lying down and taking rest, a difference of more importance in its favor than may be generally imagined, for a horse takes from three to four hours to masticate a stone [14 lbs.] of hay, but a mash of potatoes of double that weight may be eaten in forty minutes. But for young and working cattle, in the full enjoyment of their health and strength, it may admit of doubt whether the constant use of such soft food may not weaken the powers of digestion, and relax the tone of their muscular fibre; for it has been found, from very careful trials, that, when only a small quantity of roots is given, the health and condition of the animals are improved by giving them in a raw state, as, in that form, they have a kindly effect upon the bowels; and, besides promoting the digestion of grain and straw, which they do in a remarkable manner, they impart to the animal an additional degree of life and spirit. In cases, however, where they have formed the chief article of food, boiling or steaming has been found to possess a more fattening quality, for it has the effect of depriving vegetables of a part of their watery juices, leaving only the farinaceous and other solid portions: thus potatoes lose about an eighth of their weight by the evaporation of water, when they are steamed, and about one-sixth of kiln-dried or baked, in which state they are, from the chemical change which they have undergone, more nutritious than when raw. There is, however, very essential difference in the quantity of nutritive matter obtained from various qualities of the potato; for although when dried, the fibrous, or solid matter may be of equal weight, yet it has been shown by various experiments that the product of starch, which constitutes the most nutritious portion of their substance, varies from one-fifth to one-seventh of their product.*

The superiority of the method of fattening cattle with food thus prepared has been proved by many experiments; and it is even said, that some post-masters on the Western road having, in pursuance of a suggestion of the Bath Agricultural Society, boiled the oats for their horses, and given them the water to drink, have ascertained that a bushel given in that manner will maintain a horse in better condition than two in the common way.† So broad an assertion may well be received with hesitation: yet the experiment is worth a trial; and if used with caution, and mixed with a certain quantity of dry food, there can be little doubt that steaming a portion of horse provender, whether mixed with roots or not, will be found an economical plan. Mr. Curwen recommends it to be given warm; and no one at all acquainted with stable management can be ignorant of the comfort of a warm mash to a horse after extraordinary fatigue; it also improves the appearance of the coat, and the seeming condition; but it is not natural to the animal; and notwithstanding the experience of Mr. Curwen, it may yet be doubted whether, as a con-

stant practice, it would not be too relaxing. At the utmost, the mere chill should be taken off.

The objections usually urged against steaming are, the expense, the trouble, and the difficulty of preparing the feeds for several teams. But an ordinary *steam apparatus* may be put up for a mere trifle, and food enough for a dozen or twenty horses be got ready, with little difficulty, in a short space of time, and with a very moderate quantity of fuel. When the cattle are not sufficiently numerous to justify the erection of a steaming-shed, the copper commonly placed in the corner of every wash-house may be replaced by an iron boiler, and used for this purpose.

Fodder.

Notwithstanding the numberless experiments which have been lately made on almost every kind of cattle food, and the extensive use of *straw as fodder*, it is remarkable, that no accurate account has yet been published of the relative properties of the different species. Those writers who have treated the subject the most scientifically yet vary in their estimation of its qualities,* and these are subject to many gradations, according to the soil and season, as well as to the nature of the grain by which it is produced. It is thought that, when grown on gravelly or rich clay soils, it is more valuable as fodder, than when it is reared on black deep loam or cold moorish land; and it is now generally admitted that it possesses more succulence when the corn is rather green than when it is in a riper state. It is supposed by many that the straw of wheat is the most nutritive; it certainly makes the strongest manure, and is thought to be the best for either steaming or cutting into chaff. Although that of oats is usually preferred, as more soft and more palatable to cattle, that of barley is so poor and brittle, that it is only employed as litter; it is extremely difficult to save it in any tolerable degree of order; and, though it has been said to possess more nutriment than that of wheat, yet, when the crop is fully ripe, the ears break off in handling, which has been contended as sufficient proof that it contains but very little sap.† Rye-straw is so scarce in all except the northern counties and some parts of Wales, and is in such demand for thatching, brickmaking, &c., that it is but seldom applied to other uses.

When not allowed to be carried off the premises, the chief value of white straw, for farm purposes, lies in its conversion into manure—for although it may carry store-cattle through the winter, it will neither fatten them nor enable any animal to work—and its intrinsic worth, for the uses of litter and of occasional feeding, has been estimated by experienced farmers as high as 30s. the ton;‡ but that calculation was made at a time when all farm produce, and consequently manure, was higher than at present, and it may now be reduced to 20s. Weight for weight, there is a material difference between that and the common price of hay; but as the same quantity cannot be substituted for hay, either its own proportionate increase of quantity, or the value of any other

* Professor Von Thaer, *Principes Raisonnées d'Agriculture*. Annales de l'Agriculture Françaises.

† Scottish Husbandry, pp. 378—386.

‡ Sir John Sinclair: *Scottish Husbandry*, 2d Ed., p. 880. Brown, of Markle, *Treatise on Rural Affairs*, vol. i. chap. v.

* Sir Humphry Davy's *Agricultural Chemistry*, p. 128.

† *Mechanic's Magazine*, October, 1831.

food given to make up the deficiency, must be added in order to ascertain the saving: thus, supposing 24 lbs. of hay, at 3*l.* per load, to be the daily allowance of a horse, and this to be replaced by 24 lbs. of straw, and 28 lbs. of Swedish turnips, the latter valued at 6*s.* 8*d.* per ton, or 4*d.* per cwt.,* the difference excluding fractions would be

24 lbs. of hay,	24 lbs. of straw	d.	
or 8½ <i>d.</i>	28 " turnips	2½	or 9 <i>s.</i> 4 <i>d.</i>
	drawing and slicing	1	to 10 <i>s.</i> 6 <i>d.</i>
	(if steamed)	½	per week
Saving per horse per day		4	on a team
		—	of four.
		8½	

Whenever straw is used, weight for weight, instead of hay, their relative value, *per load*, may be estimated according to the following scale:—

Hay 36 Trusses, 56 lbs. each	† = 2016	lbs. hay at 45 <i>s.</i> = straw at 28 <i>s.</i> 6 <i>d.</i>
Straw do. 36 lbs. do.	= 1296	" 60 <i>s.</i> = " 3 <i>s.</i>
		" 72 <i>s.</i> = " 4 <i>s.</i> 7 <i>d.</i>
		" 84 <i>s.</i> = " 5 <i>s.</i> 3 <i>d.</i>

From which calculation it results that, even when the sale of straw is permitted, it may be economically substituted for hay, during the winter months; for the customary market load of wheat-straw seldom fetches more, even in great city markets, than 36*s.*, which, deducting the expenses of binding and carriage, will not, in most places, leave so much as the above sum net. †

The *haulm* of beans and peas, but especially the latter, when well harvested, forms a very hearty species of fodder. The stalk of the beans, indeed, is tough and somewhat woody, and is therefore commonly thrown out as farm-yard litter; but the coving chaff is very good manger-meal, and even the stalk, if bruised and cut and then steamed, would be found useful in a farm-stable.

Pea-haulm is very generally employed as rack-meal, for which purpose it is well adapted, being succulent and nutritious, and nearly as much relished by cattle as hay, and although it may not go quite so far, there is yet a great saving in its use. But both these, and all other kinds of straw and haulm, should be given as fresh as possible from the flail, for they grow brittle, and lose a portion of whatever sap they possess by exposure to the air: if long kept, they grow musty, and in that state neither are wholesome nor will be eaten by horses. Pea-haulm should be given cautiously, as it is flatulent and apt to occasion colic: it is also said to be productive of bots; but that, if true, is not so peculiar a property as to prevent its use.

* The value of the turnips is calculated on the supposition that the acre produces 15 tons of roots, exclusive of tops and tails, worth 5*l.* per acre on the ground. The quantity is too high for some soils, and some modes of cultivation, especially in the southern counties of England; in others, it is too low, but, as an average, it comes near the truth, and each farmer may make his own calculation according to the produce of his land.

† N. B.—The market weight of the truss of new hay, is 60 lbs., until the 4th of September.

‡ Mr. Middleton calculates the expense of binding and marketing straw, within eight to ten miles of London, at 15*s.* 6*d.* per load; viz. binding 1*s.*, two horses, cart, and driver 11*s.* 6*d.*, toll-gates 1*s.*, beer, market, and salesman's charges 2*s.*, which, allowing 5*s.* 6*d.* for back carriage of dung, would reduce the net price to 26*s.* per load—*Survey of Middlesex*, 2d edit. sec. iv. p. 322.

The *straw of canary-seed* is also an excellent fodder; but the cultivation of the grain is too limited to render it an object of general notice.

Proportion of Dry Food.

The most nourishing food given to horses consists of corn; and *oats* are commonly considered as the best adapted to their constitution; but when any other species of grain is furnished in like proportion of weight, the nicest observers have not been able to discover any apparent difference in its qualities, provided it be mixed with a proportionate quantity of straw, chopped fine, or of bran, to supply the place of the husk of the oats, without which other corn should not be given. Horses when not pressed by hunger, often try to separate this chaff, or bran, from the grain, and it is therefore customary to sprinkle it with water; but in that case the greatest care should be taken to thoroughly cleanse the manger, for nothing is more noxious to horses than food thus wetted and allowed to become stale. Grain of every description ought to be free from the natural fermentation which it undergoes if not in a perfectly dry state. Oats harvested in a wet season have been known to occasion epidemical disorders among cattle, and farmers frequently do serious injuries to their horses by supplying them with it soon after it has been reaped. Corn that has sprouted is not unwholesome, provided it has not imbibed a bad smell from having been heated; and malt, or barley which has been only slightly steeped for two or three days, though without being dry-malted, is considered particularly nutritive. It is thought, indeed, that the completion of the process adds much to its invigorating properties, and it is often used in that shape on the continent, though not in a larger proportion than one-third of other grain; * but, even if it has that effect, the duty on malt prevents its consumption by cattle in this country, and it cannot even be purposely wetted without incurring the suspicion of the excise. Many horses, also, which eat voraciously, are in the habit of bolting their food without chewing it; in which case their oats should never be given without being either mixed with chaff, or else bruised by cylinders, such as are used in bruising or grinding malt.

Beans, and latterly *peas*, are also largely given to farm-horses, without any prejudicial effect; and, if care be taken not to supply them in summer, at which season they are found to be too heating, no bad effect will be found to arise from their use; but, as they contain an unusual proportion of sap, they should be at least twelve months old: if they shrink in quantity, it will be made up in quality.

When horses are fed on *hay*, it is a matter of dispute whether the light and apparently arid grass of uplands, or that of more fertile natural meadow ground, or the rich produce of the artificial grasses, is to be preferred. This must however depend on the quantity of corn with which they are supplied. When that is abundantly furnished, there can be no doubt that the former will be found better for their general health, and especially for their wind; but as farm-horses are generally limited in their consumption of grain, and the slowness of their movement renders the clearness of their wind a

* Von Thaer, *Principes Raisonnees d'Agriculture*, vol. iv. p. 695.

matter of comparatively little moment, the other kinds will be found the most substantial, and consequently the best adapted to support their strength.

There can be no doubt that the feeding of horses upon hay, in whatever quantity it may be supplied, can never be entirely substituted with equal effect for corn; but opinions are also divided respecting the proportion in which it may be furnished, both with regard to health and economy. On this, however, no general rule can be laid down, for it must not only depend upon the animal's constitution, but also on the work which he has to support. It has, however, been calculated, by a foreign writer of great experience,* that ordinarily 8 lbs. of meadow-hay are equal in nourishment to 3 lbs. of oats: 7 lbs., however, of sainfoin, tares, clover, or other succulent hay, are supposed equal to the same quantity, though sainfoin is perhaps entitled to the preference; but 9 lbs. are thought to be required from hay made of poor pasture. The longer too, within a certain time, that hay is allowed to stand in the stack, the better it is, and perhaps that which is a year old is the most wholesome for horses: the second growth is not equally nourishing. It should also be got into the stack as soon as properly dried, in order to preserve the freshness of its scent, which is peculiarly gratifying to cattle.

In general, however, it is to be observed that, when the quantity of hay is augmented with a view to the diminution of the corn, although horses will thereby acquire more fat than upon the same proportion of grain, yet they are less equal to the efforts of hard work; whereas, if the corn be increased and the hay diminished, though the cattle may appear to grow thin, yet their flesh is more firm, they are capable of greater exertion, and are in what is usually termed 'better condition.'

Soiling.

With respect to the advantages of *soiling horses on green food*, in the yard or stable, it seems to be now generally understood that, with proper management, they can be supported with great health and vigor: its economy, however, must depend on the proportion which it bears to the price of dry food, and its convenience to the quantity in which it can be spared for other cattle.

It is a very old, though by no means a universal practice,† and the experience of hundreds of farmers proves, that horses maintained in that manner for years have neither lost flesh nor strength sufficient for all farming purposes, although there was no palpable saving of their work, and that, though afterwards placed on dry food during the winter, they continued in perfect health. It is an excellent plan to give some green food along with the corn and chaff, before the usual period of feeding entirely on dry fodder: the change from dry to green, and again from green to dry food, should be gradual. In its commencement, the clover or

tares should be cut, and mixed in small portions with straw, and a proportionate quantity of corn should be reduced. The green food is then insensibly increased, until the corn is entirely omitted, and the quantity of green meat is supplied without limitation: it should, however, be cut over-night, and given only in small quantities gradually increased, to guard as much as possible from accidents, which may arise from its succulence by hoving. When horses are soiled, they never should get much at a time, a practice far too prevalent among servants.

The *summer feeding of horses* was formerly confined to pasturage; but of late years the practice of soiling has become very general. The benefit of grazing consists in its requiring little attendance; and being the most natural, and therefore the most healthful, it is preferable for all young cattle which can be spared from constant labor, and on farms which contain a considerable portion of rough pasture. But for horses at regular work, these advantages are counterbalanced by the time lost in getting them up from the field; the indisposition to labor which they acquire by being at large; and the annoyance which they suffer from heat and flies when turned out in the day-time. The value of their dung and urine is also in a great measure destroyed by being scattered upon the surface of the ground, and exposed to exhalation of the sun and wind; and there is much waste of grass, and injury done to the mellowness of the soil, if it be valuable land, by the treading of all heavy stock, but especially of horses. The utility of soiling consists in a more economical consumption of grass, whether natural or artificial, than by grazing; in the accumulation of manure, and in the quiet and coolness which the cattle enjoy under sheds, or in the stable, during mid-day, as well as in their being always ready when wanted: the only disadvantage is the expense of cutting and carrying home the grass, against which may be fairly set the increase of manure, if expense be really incurred; but as during summer, there is usually a long interval of rest between the morning and afternoon work, the carters can then cut the necessary quantity, which may be drawn to the homestead by one of the team-horses, if there should not be a supernumerary one left for odd jobs.

When, however, the economy of the practice is not the chief consideration, horses on summer work may be both *grazed out and soiled*. They may be put on cut clover in the middle of the day, between yokings, and turned out during the night into a well-sheltered meadow or enclosure. In being kept under cover during the heat of the day, they will be sheltered from flies, and will feed more at ease; and in being pastured out during the night, they will also have an opportunity of selecting those grasses which act as condiments and are most agreeable to their palate. All animals like variety of grasses, selecting always what is most palatable, which they cannot do when soiled, particularly if fed on cut clover or tares. Exposure to the night air is also found to be highly favorable both to their health and appearance.

The economy of soiling, wherever it can be conveniently adopted, is, indeed, too generally admitted to need the support of argument; and particularly on soils on which turnips are entirely consumed on the ground, or on which they cannot

* Professor Von Thaer, of the Royal Farm and College of Agriculture, established by the King of Prussia, at Moegelin, near Frauchfort upon the Oder. The translator of his work—the Baron de Crud—calculates that a horse consumes one-eighth less of meadow-hay than of that made from the artificial grasses.—Vol. i. p. 162, note.

† It is mentioned in a treatise on Agriculture, entitled 'Hartlib's Legacy,' so long ago as 1650, p. 245.

be grown, and where, consequently, there is difficulty in converting the straw into manure during the winter, it cannot be too strongly recommended. But it requires a succession of green crops; and as only the artificial grasses are resorted to in England—though in many parts of the continent the meadows are also mown for that purpose—it is necessary that winter and summer tares should be sown at different periods, so as to afford a constant supply, both before clover comes in, and after the first crop is off. This is a great impediment to the practice in Scotland, and in some of our northern counties, where tares are an uncertain crop; though cattle are certainly soiled with great advantage, both there and in other places, on clover alone. In other situations too, farms, on strong clay, frequently contain a large portion of meadow, and grazing being combined with tillage, the whole of the straw is consumed in the winter, in which case one of the chief advantages of summer soiling would be lost, as yard dung, without the addition of straw, is of very little value. But even in this instance, or in others where the distance of the fields from the homestead may be opposed to the cartage of the grass, it is better to cut it daily, and give it on the ground in pens, or small inclosures hurdled off, so as to prevent the cattle from injuring the growing crop, than to allow them to range over and trample it. By confining them in this manner to a small space, and moving the hurdles forward as the grass is eaten, the fertilizing properties of the dung and urine, which would otherwise be lost, are in a considerable degree preserved; and if the land be immediately ploughed, it will be nearly as much benefited as if it were more regularly manured.

The artificial grasses used for soiling are the same as those already enumerated as hay, but here tares take the lead, both because the winter species is earlier ready than any other, except ryegrass, and affords a weightier crop. In most seasons, tares are ready for the scythe towards the middle of May, for if left till they are quite ripe they will become unfit for soiling before the crop can be used; and although there may be some loss in using them so soon, it will be compensated by the saving at the latter end, as well as by commencing the soiling sooner than would be otherwise practicable. Before they are off, clover will be ready; the tares still standing may then be made into hay, and by the time the clover is becoming strawy, and losing its succulence, spring-tares will come in, which, if they have been sown at intervals of about a fortnight each, will last until the second cut of clover: or, if spring-tares be not sown, the growth of part of the clover may be checked by light early feeding. There is also an excellent fashion regarding soiling in Dorsetshire, which consists in sowing a portion of rye alone, to be cut green; then another portion of rye, with tares; and afterwards the remainder entirely with tares: the rye comes first into use, and assists in raising the earlier tares, while those of later growth do not require any such nursing. Thus horses may be kept upon a succession of green herbage, without touching the meadows, throughout four months of the summer and autumn, and, while thus fed, require very little corn; when stirring the fallows, and during the hurry of harvest a couple of feeds a day may be serviceable, but more is un-

necessary, and at other times should be wholly omitted.

The mention of *lucerne* has been omitted, although extremely valuable for soiling, because it requires a peculiar quality of land, and is not commonly cultivated. In the *Essex Report*, it is said, that two horses have been supported during four months upon a quarter of an acre, with scarcely any thing given to them besides; and that six horses, at hard work, have been kept on lucerne, instead of hay, but with an allowance of oats and chaff for twelve weeks—six from the first cut; four from the second; and two from the third: which, valuing the hay saved at 3s. per horse per week, would amount to £10 16s.* A paper in the communications to the Board of Agriculture also states that, in one year, twenty-three horses have been kept twenty weeks, and in the next, twenty-eight horses during eighteen weeks, upon eleven acres alone; which gives an average of three roods per horse in nineteen weeks.† It is also extensively used on the coast of Normandy, and in the neighboring islands of Guernsey and Jersey; but it is there said that horses, particularly those used for the saddle, require more precaution from overworking, when first going out of the stable, than when fed on other hay; and, what is singular, that when soiled on green lucerne, there is not the same danger.‡

In Holland and Flanders, where the feeding of cattle is supposed to be better understood than in most places, the summer soiling of farm-horses is limited to half an acre of meadow grass, cut and carried to the stables, from the middle of May to the middle of June; from which time to the end of August one-sixth of an acre of clover is added, with 2 lbs daily of beans; and from thence to November, when the winter feeding commences, the clover is replaced by an equal quantity of carrots. From the number of horses stated, in this instance to be kept in proportion to the tillage—11 to 150 acres, of alluvial soil—their labor can, however, be only light; though a pair is said to draw a ton and a half of manure in the field, and three tons upon pavement.§

Accounts have been also published, showing that horses may be regularly worked throughout the summer, in this country, without any corn: thus green crops, consumed by soiling, are said to go four times as far as when grazed; and that, in this manner, one acre of clover is equal to six of meadow pasture. But many of these statements rest only upon opinion, or upon insufficient data, and in all, so much depends upon the state of the crop, the size and health of the animal, and the work performed, of which the account is generally imperfect, that no safe conclusion can be drawn

* Young's Survey of Essex, vol. ii. pp. 71, 72.

† Vol. vii. Art. 25. Part I.

‡ Quayle's Survey of the Islands on the Coast of Normandy, p. 117.

§ Radcliff's Report of the Agriculture of East and West Flanders, p. 216. Another farm, of 200 acres, mentioned in the same Report, is cultivated by eight horses, each of which get daily, in winter, 15 lbs. of hay, 10 lbs. of straw, and 8 lbs. of oats; and, after every feed, a bucket of water, 'richly whitened with rye or oatmeal': in summer, clover is substituted for hay, but the other feeding remains the same, and the 'white water' is never omitted.—p. 54.

from them: it is therefore unnecessary to refer to them; nor is the cause which they are meant to promote assisted by being advocated upon any other than its real merits. A medium-sized farm-horse, at customary labor, consumes from 84 lbs. to one cwt. of green food daily, with an occasional allowance of corn. Now a good acre of tares, or of broad clover, will weigh twelve tons, (that is, presuming the tares to be cut only once, and the clover twice*; for although winter tares may be cut again, it is more usual to get them off the land as soon as possible, either in order to sow turnips, or to form a bastard fallow;) and, taking that weight as the average of both, and the consumption at the highest rate, half an acre of either would support a horse during four months. This nearly accords with some instances in the county surveys; in others, more have been consumed, and for the reasons already stated, it is next to impossible that any two accounts should agree; but, upon a rough estimate, it may be affirmed, that about a perch per day will be required for each horse in most seasons, and on most kinds of lands, if soiled, and that double that quantity will be necessary if pastured.†

It must, however, be borne in mind that the difference in the degree of succulence contained in various grasses must necessarily have a material influence on the state of the cattle by which they are consumed. Of this farmers are generally pretty well informed, either through their own observation, or by the experience of others; but an accurate acquaintance with the subject was not attained until the experiments made at Woburn, by which Mr. Sinclair has been enabled to ascertain the quantity of soluble nutritive matter afforded by all those grasses which constitute the produce of the richest ancient pastures, as well as those of artificial growth, and which will be fully adverted to in a future portion of this work.

The custom of giving corn along with green meat is unprofitable; for the grain, thus mixed, passes rapidly off the stomach, and is never perfectly digested. When, however, increased exertion demands an addition of more substantial food and that corn is also allowed, it should be given only in the morning and at night, accompanied with a sufficient quantity of chaff to afford it consistence, and green meat should only be given at mid-day. Farmers very generally omit that pre-

* From an experiment made at Woburn, the green weight of an acre of broad clover was found to be 49,005 lbs. = 21 tons. 17 cwt. 2 quars. 5 lbs.; but the soil is described as a rich clayey loam, and the crop cannot be assumed as an average. See *Sinclair's Hortus Gramineus Woburnensis*; and the *Appendix to Sir H. Davy's Elements of Agricultural Chemistry*.

† In one instance it is stated, that twenty horses have been supported for three months on six acres of tares (*Rutlandshire Report*, p. 71;) and in another, that fifty-one heads of cattle—cows, oxen, and horses—were kept, during that period, on 15 1-2 acres of mixed herbage; or, in each, about half a perch per day. (*Comm. to the Board of Agriculture*, vol. vii. part 1, art. 1.) A third mentions, that twelve horses and five cows, which, together may be considered equal to eighteen horses, consumed, in the same time, eight acres of tares, or 3 quarters and one-thirty-second part of a perch each daily (*Middlesex Report*, p. 257;) and a fourth states the allowance of pastured tares (for twelve horses) to be an acre per week, or nearly two perch each day. (*Essex Report*, vol. ii. p. 354.)

caution, and it is a common custom among them to allow half the usual quantity of corn, without regard to the effect of the watery juices of grass upon the digestion; but they may be assured that a great portion of the nutriment contained in the grain is thus wasted.

• Winter Food.

It cannot be doubted that working horses can be supported during the autumn and winter, until the growth of the young grasses, with only roots and hay, and plenty of hay and straw, without giving them any corn. But, although they can be maintained in perfect health and apparent vigor, yet they will be incapable of any strong or unusual exertion. Perhaps the most wholesome root, and that most relished by them, is raw carrots, without the tops, and then coarsely washed and sliced. Although, as we have already seen, potatoes have been advantageously used, yet it must be admitted that they are thought to occasion a certain want of spirit and flabbiness of flesh, which probably arises from the use of boiled food. It is also well known that, in many other cases, animals have refused even to taste them. This, however, has probably arisen from some want of care in the preparation—for, if boiled too soft, or in a mashed or wet state, they will not be eaten by horses: they should therefore be always steamed, and daily fresh dressed, nor should any other than the floury sorts be chosen. There is also some management requisite in getting horses to change their taste for any kind of food with which they are unacquainted: thus, a new species of root should be given in a small quantity by hand, when there is nothing else to eat, and apparently to coax them: when they relish that, a portion may be mixed with their other food, and in that manner they will be induced to overcome their dislike.

The *cavalry allowance* of hay and oats to horses in barracks, is 12 lbs. of the former, and 10 lbs. of the latter, on which they are kept in high condition; but it has been ascertained by experience, that a common cart-horse cannot be supported in good working order on less than 28 or 30 lbs. of the same food, or more, if straw be substituted for any portion of the hay, supposing him to be of a medium size, and only employed on the customary farm labor; when greater exertion is required even that is insufficient. In some of the brewers' and coal-merchants' stables in the metropolis, the common allowance amounts to 36 lbs. of dry food daily; and in those of Messrs. Wiggins, the great cart-horse contractors, it varies from 36 lbs. to 40 lbs., according to size and work, in the proportion of 16 lbs. of clover or sainfoin hay, and 4 lbs. of straw to 18 lbs. of grain, consisting of oats or barley, beans or peas, and 2 lbs. of bran. The corn being given by weight, no difference is made in the amount of the allowance whatever kind may be used, and the choice depends more on price than on any settled rule; except that oats are preferred to beans in summer, and that rather more bran is allowed with the latter. Salt is not given regularly; but much benefit has been derived from the occasional use of carrots and Swedish turnips sliced along with the chaff.

The whole of this food is given as *manger-meal*, no part of it being put into the rack. The hay and straw are cut very short; the beans are bruised, and the oats sometimes coarsely ground; but it is

found most advantageous to wet the barley, and allow it two or three days to sprout. The chaff is cut by a horse-mill, which at the same time bruises the beans by a small addition of machinery, and one horse with a couple of lads, one to unbind and deliver the hay, and the other to fill the trough, will cut a load of hay in three hours. The machinery, which consists of nothing more than a common chaff-cutter, of somewhat larger size than those used by hand, and a bruising apparatus of very easy construction—both of which may be readily added to a thrashing-mill—works in a loft above the horse-course, on the floor of which the whole provender is afterwards mixed: the chaff being spread first, next the bruised corn, and lastly the bran, the whole is united in one mass; and having been separately weighed, is then measured off in distinct portions.

The horses, thus fed, are however, of the largest size, and being used for drawing very heavy weights, consequently require more sustenance than the common run of farm cattle, for which the amount of dry food already stated—28 lbs. to 30 lbs. will generally be found sufficient. Taking the latter quantity, a suggestion published in the 'Sporting Magazine,' and recommended to the attention of farmers, is deserving of notice, as furnishing some useful hints, founded upon long experience of an eminent medical gentleman, in feeding light draught horses, which undergo very considerable fatigue in constant journies, at a rapid pace, and yet, on that allowance, are kept in perfect working order. The ingredients of the food are divided into four classes, containing different quantities of each, to be used as discretion or convenience may dictate, in the following proportions:

	1st.	2d.	3d.	4th.
	lbs.	lbs.	lbs.	lbs.
Bruised, or ground beans, peas, or white corn	5	5	10	5
Hay cut into chaff	7	8	10	8
Straw, do.	7	10	10	8
Steamed potatoes	5	5	—	—
Malt-dust, or ground oil-cake	—	2	—	2
Brewers' grains	6	—	—	—
Bran	—	—	—	7

And 2 ozs. of salt to each* 30 30 30 30

The weight of each class is 30 lbs., and the quantity of nutritive matter contained in their ingredients is supposed to be equal. The first and second classes, of which potatoes form a part, are however preferred by Dr. Sully, though the grains had the oil-cake with which they are combined do not appear to form an adequate substitute for the difference made in the allowance of corn. Of grains, it may also be observed, that their too frequent or copious use has been found so injurious to horses, that those of brewers, when so fed, are said to become rotten and die in a few years; and on dissection are found to have large stony concretions in their bladders.†

As to the salt, the propriety of its daily use is open to question. That it contributes to the health of animals, is a fact too well established to admit of doubt; but the manner in which it acts

upon their constitution—whether by merely aiding digestion, or by cooling and correcting the impurities of the blood—has not been sufficiently ascertained to fix with certainty either the mode, or the amount of its application. Numberless experiments on this subject have, indeed, been recorded, all tending to prove that it is relished by cattle, and improves their condition; yet, still the quantity to be administered to each, the time when it should be given, and its precise effects, remain to be determined, and can only be defined by more accurate trials than have been yet made. In this, however, as in all matter regarding the treatment of animals, nature, when she can be consulted, is ever the surest guide. The tastes with which she furnishes her creatures, instinctively direct them to those kinds of food which are the most nutritive and the most healthful; but, although most animals in a wild state evince a taste for salt, it yet is only occasionally, and not regularly, indulged. The 'salt licks' of America, which are masses of mineral salt, so named because they are licked by the beasts of the forest, afford abundant evidence in the excavations which have been thus made, that salt is essential to animal health: the elk, the deer, and the buffalo, traverse immeasurable wilds in search of them, and tracks are found leading directly to them from the remotest pastures. But the instinct which leads those animals to seek the 'licks' and 'salt springs,' in which they are even said to bathe, is only periodical; the impulse once obeyed, they retire to their usual haunts, nor return until the recurrence of the same season. This, singly, would go far to show that salt is only useful as a preventive of disease, and should be only occasionally administered in large doses; but there are so many other well-attested instances of animals which thrive upon the constant use of saline plants, and of water impregnated with salt, that it cannot be considered as amounting to proof. That it is not hurtful when given moderately, in any way, is certain: but whether it should be employed in small quantities daily, or to the extent of half a pound at a time, for horses, and only once a week, or whether the practice should be confined to summer, is not so clear: perhaps a better mode than either would be to place a lump of rock-salt in a corner of the manger, and allow the horse, after having made him acquainted with its taste, to use it at his pleasure.

The points most worthy of imitation in this gentleman's management are the *order and economy of his stable*. He justly observes, that grooms are wasteful of hay, and by allowing the horses an unlimited use of it, tempt them to eat too much: his stables, therefore, are without racks: the loft above contains the machinery for cutting and grinding the chaff and corn, and when prepared, each horse's provender is put into a tub, from which a tunnel leads to the manger underneath, by means of which it is conveyed to him without further trouble. It is given in small quantities at several times during the day, and at night enough is thrown into the tub to last until the morning. This is a most excellent plan, and might be still further improved by a contrivance in the tunnel to prevent more from descending than the horse will eat at one time.

The method of converting the entire provender into manger-meat has been borrowed from Flan-

* Letter from Dr. Sully, of Wiveliscombe.—*Sport. Mag.*, vol. xix. p. 15.

† Middlesex Report, 2d Ed. p. 469.

ders, in which country it is the universal practice, and the farm-horses are invariably in high condition. Its value consists—

1st. In its requiring a more thorough mastication of the food than when it is given in the common way, thereby assisting digestion, and consequently promoting the nutrition of the animal; for, it is not only true that old horses lose much of the power of mastication, and that young and greedy cattle are apt to devour a considerable part of their corn entire, when it is given alone, which passing through them in the same state, affords no kind of nourishment, but all animals are known to derive nutriment from their solid food, in a certain degree, in proportion to the care with which it is chewed.

2nd. It is consumed in less time.

3d. By the mixture of the materials, some portion of which, as damaged hay, or straw, might be refused if given separately, an equal consumption of the whole is secured.

4th. By its admitting of being more readily weighed, or measured, than when given separately, it can be more accurately distributed to each horse; on which it may be observed, that more injury is often done to horses by allowing them an unlimited quantity of rack-meat, than even by stinting them to a scanty allowance; for they will not only pass whole nights in eating, when rest would do them more service, but, by this extraordinary distention of the stomach, its powers are weakened, and their general health is injured.

5th. It prevents waste, and consequently it goes farther.

Many exaggerated accounts of the saving thus made have been published, some of which state it as high as one-third, others even one-half, of the rack-meat: these are only calculated to mislead; or, by their improbability, to cast a doubt upon the testimony of those who have made such statements; but, according to the opinion of Messrs. Wiggins, whose business extends to the daily feeding of more than three hundred horses, it may be fairly estimated at one-sixth. These advantages are so obvious, that it is unnecessary to press them upon attention; but it must be admitted, that the practice is attended with the inconvenience of occupying more of the carter's time,—independently of that employed in cutting the chaff—than the customary method; for horses being apt to blow upon manger-meat, and then to reject it, when given in a large quantity at one time, it must be administered with a sparing hand, and renewed when the manger is empty, thus requiring constant attendance until the last feed is put in.

Before quitting this subject, it may not be irrelevant to advert to the custom of giving *oats in the straw*, cut together, which, although recommended by some eminent agriculturists*, and common in many places—especially in East Kent, where it is mixed with the barn-chaff, provincially *'taff and chaff, and colder,'*†—only deserves notice in order to be reprobated. Throughout the greater part of that country, the regular mode is to employ a man and a mate to each team of four, when

two turns of work are made in the day. The time of going to work is six in the morning, returning at ten, and then going out again at one until six: nine hours in the whole. It is the carter's business to bait the team from four in the morning until six, and the mate takes that duty during noon, and from six till ten, when the stable is shut for the night. The food is wholly cut into chaff, and the corn, whether beans or oats, *cut with it in the sheaf*. The only advantage attending the practice of cutting the oats is the paltry saving of thrashing, while it precludes all knowledge, beyond a vague guess, of the acreable produce of the crop, the quantity of corn for the whole number of horses, or the share which falls to each, and it may be confidently pronounced a slovenly and unfarmer-like practice.

Nutritive value of Food.

The next consideration is the *relative nutritive value* which the different kinds of *winter food* in common use bear to each other. Although chemistry has enabled us to ascertain the component parts of vegetables, and it may be presumed that the worth of all articles of cattle-food is in a great measure proportionate to the quantity of soluble, or nutritive matter which they contain, yet it has not clearly demonstrated that such proportions actually denote their exact degree of merit. The essential elements of vegetables consist of what chemists call hydrogen, oxygen, and carbon, in various proportions, combined in some cases with a small quantity of azote, and the different combinations of all these produce gluten, or albumen, saccharine matter, mucilage, and starch. Gluten, which is the most nutritious, is nearly allied in its properties to animal substance; saccharine matter may be considered as possessing those of sugar, and mucilage those of gum; there is also an extract which is not supposed to contain any nutritive matter, but has been found useful to animals in a medicinal view. According to an analysis, made by Sir Humphry Davy, of the amount of those substances found in 1000 parts of different kinds of corn and pulse, it appears that the following are their proportions in those employed as food for cattle.

GRAIN.	Whole quantity of soluble, or nutritive matter.	Mucilage and starch.	Saccharine matter, or sugar.	Gluten or Albumen.	Extract or insoluble matter.
Norfolk barley,	920	790	70	60	—
Yorkshire rye, -	792	645	38	109	—
Scotch oats, - -	743	641	15	87	—
Common beans,	570	426	—	103	41
Dry peas, - - -	574	501	22	35	16*

But these results have been obtained by experiments made through solution in water, and it is not improbable that both the action of chewing the salivæ, and the solvent juices of the stomach, may have a very different effect upon the food when it is eaten; for they are more beneficial in their joint operations than mere solution by com-

* Parkinson: *Essay on Live Stock*, vol. ii. p. 168. Middleton: *Survey of Middlesex*, 2d Edit. p. 462.

† Kent Report, 2d Edit. p. 183. Complete Grazier, 5th Edit., p. 175—177.

* Elements of Agricultural Chemistry, 4to. p. 131.

mon water, and the properties of grain are known to change, or to be lost, in the processes of malting and baking. It is also possible that certain combinations of those substances may be more nutritive than others; and therefore, although the chemical tests have thrown considerable light upon the subject, they yet cannot be deemed conclusive. There appear, indeed, to be about as many varieties of extract as there are species of plants: the difference of the properties probably in many cases depended upon their being combined with small quantities of other vegetable substances, or to their containing different saline, alkaline, or earthy ingredients. It is probable that the excellence of the different articles as food will be found to be in a great measure proportional to the quality of the nutritive matter they afford; but still their quantities cannot be regarded as absolutely directing their value. Experience, however, which is the farmer's surest guide, has to a great extent confirmed the accuracy of the analysis, and has in this instance added one more to the many existing proofs of the assistance which husbandry derives from science.

On reference to the table, it will be seen that oats are greatly superior in nutritive matter to beans; but this must be understood with regard to their respective weight, for, used as they are in England, by measure, and taking the average weight of a bushel of common horse-beans at 56 lbs. and of Scotch oats at 40 lbs., the difference between the two will be as 31,920 to 20,720, or nearly 16 to 15 *per bushel*, in favor of beans. The same remark will nearly apply to the relative value of peas; with this distinction, however, that as they contain less gluten than beans, they are perhaps neither so heating, nor so nutritive; and experience has shown them to be more flatulent.

The difference in weight of the various grain used in feeding horses is not in general sufficiently considered. Most people look only to the prices, and finding beans at perhaps 5s., when oats are only at 3s. 6d. the bushel, they conclude that the latter are cheaper in that proportion; without reflecting that, were the bushels weighed, the prices would be found nearly equal, and that, were feeding regulated by weight, the cost of either would be about the same.*

The custom of feeding by measure has led to a prevalent idea that beans are more nutritive than oats; though, weight for weight, we have seen that the contrary is the fact; and both that and the heating quality ascribed to them has probably arisen as much from the greater amount in an equal measure, as from any other cause; for, although it would appear that a bushel of either contains nearly an equal portion of nutritive matter, yet bulk, or weight, is also of importance in feeding, and it is certain that, in practice, an equal measure of beans is superior to the same quantity

of oats. It also occasions constant irregularity in the common feeding with oats alone; for these vary in weight, according to soil and season, from 30 lbs. to 42 lbs., and even more, per bushel: thus a quarter of good feed oats, which ought to weigh 2½ lbs. is often reduced to 2 lbs., and though the horse is thereby deprived of one-fifth of his corn, yet, the same measure being thrown into the manger, the fact is seldom adverted to.

The following table* will show the quantity of meal that is usually extracted from certain weights of that grain; and, though different results may be obtained by various qualities and seasons, yet the progressive ratio of the produce will generally be found nearly similar:—

	lbs.		lbs. oz.		lbs. oz.
	42	produce in meal	25	2 ditto in husk	16 14
	40	"	23	"	16 10
Weight	38	"	21	"	16 4
per bushel	36	"	19	"	15 13
avoirdupois.	34	"	18	"	15 5
	32	"	17	"	14 11
	30	"	16	"	13 5

Rye is very generally employed as horse-food in North America. It is there given coarsely ground, and sprinkled over straw and clover chaff, previously wetted, by which means the whole mass is well incorporated; mastication also is so much assisted that no part is wasted, and the condition of the carriers' horses on the roads in Pennsylvania, where they are universally thus fed, and are seldom lodged in a stable, proves the excellence of the practice. It is also used in Germany; but generally in the shape of bread made from the whole flour and bran, and it is not unusual in travelling through some parts of that country, and of Holland, to see the postillions help themselves and their horses from the same loaf. The plan of giving bread to horses was formerly adopted in some racing-stables in England, and the statute-book contains many acts of parliament regulating the making of horse-bread. In later times wheat-en bread of the finest quality was used, from an idea that the superior weight and value of the grain, and its well-known nutritive power, when the flour alone is converted into bread, would render it more invigorating than oats: but the experiment did not succeed, and it furnishes one among many proofs, that reasoning from analogy alone will sometimes lead to erroneous conclusions.

Barley is rarely used in this country for horses, and rye perhaps never, or only by chance; yet throughout the south of Europe, the former along with straw, is the only food given to horses and mules, the latter of which go through very severe labor, and are generally in high condition. There are various opinions concerning its properties—some considering it as more heating, others as more cooling, than oats, and all perhaps equally ill-founded. Where constantly used, it is not seen to have any prejudicial effect; and, as it appears to contain a larger portion of nutritive matter than oats, and is known to be more fattening, it is well worthy of attention, especially as the price is so much affected by mere color, which is of no importance in feeding, that inferior malting samples frequently fetch little more than feed oats of good

* Taking for the sake of round numbers, the average price and weight of oats, at 3s. 4d. and 40 lbs. per bushel, they would be worth a penny the pound; and the relative value to them, of other grain used as horse-food, at their common average weight, when of equal good quality, would be,

	Oats.	Tick beans.	Common H. beans.	G. peas.	Barley.	Rye.
Weight	40lbs.	60lbs.	56lbs.	60lbs.	50lbs.	52lbs.
Price,	3s. 4d.	5s. 0d.	4s. 8d.	5s. 0d.	4s. 2d.	4s. 4d.

* Survey of Antrim, p. 188. See a future chapter, on the cultivation of oats, in this publication; also the Farmers' Magazine, vol. xvi. p. 188, vol. xvii. p. 413, and vol. xx. p. 808.

quality. Six bushels have been found, on comparative trial, to be equal to eight of oats.*

The British cavalry was fed on barley during the greater part of the Peninsular war, and thrived upon their allowance, though it was *delivered by weight*, and was only 10 lbs. instead of 12 lbs. of oats; the barley being considered in that proportion more nutritive than oats, owing to the smaller quantity of husk.

Now it follows from this, that we have no guide on which we can more securely rely than the weight of vegetable nutritive matter to regulate its consumption. Yet it has been contended that, in the feeding of farm-horses, barley—though heavier than oats, and containing a larger quantity of extractive matter—does not contain so much nutritive substance. It is said to be more watery, and therefore, if given weight for weight, to deprive horses of a portion of their regular nutriment. An article in the *British Farmer's Magazine*,† indeed, states the saving on feeding with barley as amounting to £6 per annum, for each horse; but that grain was given, instead of oats, by weight, without any distinction between the respective nutritive qualities of either; nor does it appear whether the statement was made from the actual experience of an entire year, or was only assumed to amount to it, from a calculation made on the savings of a shorter period.

An account of its uses, in many instances, by Sir John Sinclair,‡ states its being almost uniformly given with one-third of beans, bruised or broken with the barley, or boiled, which is considered the better plan; though it certainly was not boiled for regimental service, nor is the proportionate quantities of barley and beans to oats stated: we are also led to believe that the former have been in most cases given by *measure*, in consequence of the cheaper price of barley. *Bere*, or *Big*, we also know to be sometimes substituted with economy for oats in the north, but the difference of weight is not considered: in Norfolk, too, Marshall tells us that, when barley is unsaleable at regular markets, it is sometimes given to horses, in which case it is usually 'malting,' that is, steeped for a few days until it begins to vegetate, in which state it is thought to be less heating than when given in the natural state. Being also frequently badly harvested, the pernicious effects of heat, or must, are prevented by boiling.

We will not hazard an opinion on the proportionate value of oats and barley, which can only be fairly tried by first depriving two horses for some days of any kind of corn, and then feeding them for a considerable time upon equal weights of each grain; but we certainly do feel somewhat sceptical about the value so loudly insisted upon of late, of *boiled corn* as food. That postmasters'

horses, which get an unlimited quantity, may be benefited by it, we will not deny; and a mash of boiled barley twice a week will be found to improve the general health of the animals, as evinced by the sleekness and glossiness of their coats, as it certainly has an opening and cooling effect on the bowels, which cannot but be serviceable when large quantities are consumed of heating food; but we may be permitted to doubt either its necessity or its utility for farm-horses, commonly fed: or that they require, in the winter months, more cooling food than a bran mash, instead of their corn, with an ounce of nitre, or common salt, on the Saturday night.

There is also a fact stated upon the authority of Sir John Sinclair, respecting the heating effects of unusually large quantities of corn upon the health of horses, which is well worthy of attention. It is that of an extensive coach-master, who regularly allowed three bushels of oats daily to each of his sets of eight horses, out of which, during the course of many years' experience, he annually lost a great number. Upon reflection, however, he changed his mode of feeding, and allowed instead for each set,—

- 1 bushel of beans,
- 1 ditto oats,
- 1 ditto hay and straw cut into chaff;—

the consequence of which was, that his horses were as hearty and as able to perform their work as they were ever known, and that he has only lost one since the adoption of that plan.*

In gentlemen's stables no other than *meadow-hay* is generally admitted, and it is in all respects the best; but farmers find more profitable uses for it, in the feeding of fattening stock and cows; and clover, either alone or with rye-grass, sainfoin, or tare-hay, though coarser, answers every necessary purpose for farm-horses, more especially when cut into chaff and used along with straw. *Sainfoin* is commonly esteemed the first, and *clover* the next in quality, but *tare-hay*, if well made, is very hearty food: they are, indeed, so nearly alike, that it is unnecessary to dwell upon their peculiar properties, and, were there even greater difference between them, there is seldom much room for choice, as whatever may be the produce of a farm, it must be consumed, and no one thinks of purchasing fodder for the working cattle.

Expense.

From the foregoing statements, the necessary information may be collected as to the quantity and kind of food on which farm-horses may be supported at constant labor. They lead also to the important consideration of the *annual cost of a team*, and of the labor it may be expected to perform, without an accurate knowledge of which no correct estimate can be made of the general expenses of cultivation, or of the particular charges on separate crops.

The quantity of the different articles of food, in fact, depends on the size of the horses and the labor they perform; the value, upon the prices of different seasons, and in every season upon the situation of the farm in respect to markets, particularly hay and roots, which bring very different prices at large towns, and at a few miles distance. It is for these reasons that the yearly expense of

* *Marshall's Minutes of Agriculture*, Digest, p. 43. In another experiment, besides that mentioned in the foregoing table, Sir Humphry Davy states the difference between 100 parts of oats and barley to be—

Fine Norfolk barley	79 Starch	59	Sussex oats
	6 Gluten	6	
	7 Saccharine matter	2	
	8 Husk	33	
	100	100	[Lect. III.] Elem. of Chem.

† No. IV. p. 486; but see also No. V. p. 657.

‡ In the *British Farmer's Magazine*, No. XI. p. 171.

* *Scottish Husbandry*, vol. ii., Append. No. 23.

a horse's maintenance has been estimated at almost every sum, from £15 to £40. In the Lancashire Report,* the cost of a team of three, ploughing seven statute acres per week the year throughout, is thus estimated:—

	£	s.	d.
Oats, six bushels per week for six months,			
at 23s. per quarter	19	10	0
Three ditto	9	15	0
Hay, six months at £1 1s. per week	27	6	0
Grass and green food 15s. per ditto	19	10	0
Wear and fare of two ploughs	3	8	0
Shoeing, 10s. 6d., and farm expenses 5s. each	3	6	6
	£81	10	6

In the General Report of Scotland,† the feeding is calculated on some farms as high as 15 quarters of oats each, with 22 lbs. of hay, or an English acre of clover or tares, and a quarter of an acre of potatoes, yams, or Swedish turnips while they are on straw, and thus the expense of keep—oats being 25s. per quarter—is estimated for a pair at—

	£	s.	d.
Interest on purchase, decline in value, and insurance from disease	15	12	0
Food	73	2	6
Harness, shoeing and farrier	6	0	0
	£94	14	6

Mr. Brown, of Markle, makes the charge of a plough-team of a pair, with driver, amount to†	135	1	0
Mr. Keer, of Berwick§	120	0	0
While others reduce the charge of a pair and driver more reasonably to¶	90	0	0
And others again to	80	0	0
Mr. Middleton, of Middlesex** raises it to	157	10	0

But these estimates were made at various periods, when great difference existed in prices; the Middlesex report is rather meant for the road than for common plough-work; and perhaps the present general average of the kingdom, exclusive of the charge for interest, may be calculated at about £84.

Some farm-horses, though working at the usual rate of common labor, are said to be supported during the summer on cut grass, almost without corn. 'When no beans are grown, their winter food is oat-straw or hay; but in all other cases, bean-straw alone forms their winter provender, from grass to grass, with a mess every night of bean-chaff, potatoes or turnips, and a little small corn, all boiled together and seasoned with salt; and two feeds of oats per day, but only when hard worked.' †† On this fare they are stated to be kept in excellent condition, and others are said to consume only from 15 to 25 bushels, if good oats

are given; but as draughts (*light corn*) are commonly used, the quantity is proportionably increased. Now, if the meaning of this be, that a cart-horse gets no more than that quantity in one year, it must be either made up of other nourishing food, or he must be so badly fed as to be unfit for work. And, notwithstanding all that has been said of substitutes for grain—although admitting that roots may be economically and even healthfully substituted—we must beg leave to doubt this possibility when the animal is forced to exert himself to the extent of his power. In proportion to the work which he usually and regularly exerts, he may be in excellent apparent order: but push him; try him with a few days' harder than ordinary toil, and you will find that it is not an additional quantity of roots, but of sound corn, that he requires to sustain him. The reason is evident: he may fill his stomach with roots, but they will not supply the quality of invigorating and nourishing substance which corn supplies *in the same weight*; and having filled it, he can do no more. Therefore, we repeat, that farm-horses moderately worked may do their regular days' labor with perfect satisfaction to their employer; but compel them to the full extent of their vigor, and there will be no advantage found in stinting them. When working cattle, more especially horses, are not judiciously as well as economically fed, they are either suffered to go out of condition, or provender is unnecessarily wasted; and thus, in either case, considerable injury is sustained through their deficiency of strength to perform their proper quantity of labor, or through the unnecessary expense of their keep.

Some years horses require more corn than in others; sometimes soiling commences sooner than at other seasons; and at others, from the failure of the second crops of grass, they are sooner put on hay and corn. The hay, too, has not the same succulence in some years as in others, and consequently will not go so far; and horses, like other animals, though of the same apparent strength, do not all consume similar quantities of food.

In treating this subject minutely, it would be necessary to review the various methods of feeding horse-teams, practised by different eminent farmers, but, besides that, the enumeration would be tedious, few men require such assistances to their judgment in forming an opinion of the most eligible mode, and it may be sufficient for the present purpose to assume that plan which can be most generally adopted, namely—of feeding upon corn and hay, or straw, during the winter, and soiling in summer; leaving out of the question the savings which may be made by the most economical employment of roots. Five horses will also be assumed as composing a team; for, even if ploughed in pairs, three are sometimes wanted for other work; an odd horse is always useful; and with the aid of the farmer's own nag to hook on occasionally to a third plough, a couple of hundred acres of medium soil, under a moderate rotation, and with a fair proportion of meadow, may be very well managed with that number, if there be not much out-cartage; and they may be easily worked by one carter and his mate, with a stout lad able to hold and drive, or one of the laborers, when a third plough is required. Supposing, then, the horses to be soiled from old May-day to Michael-

*Original and Corrected Report, p. 584.

† Vol. iii. p. 194.

‡ Sir J. Sinclair, Husbandry of Scotland, p. 125. § Berwickshire Report, p. 406. ¶ West Lothian, p. 178. || Library of Useful Knowledge, Farmer's Series, No. 18. Dumbartonshire Report, p. 251. ** Middleton's Middlesex, p. 97.

†† Essay on the Agriculture of the Vale of Forth, by Mr. Carmichael.—Prize Essays of the Highland Society, 1833, vol. iv. p. 24.

mas on grasses worth £6 the acre, with two quarters of oats each, at 24s. to be given on working days, and from that time to be allowed each 10 lbs. daily of bruised beans, ground oats, or barley, with 12 lbs. of clover or sainfoin hay, and 20 lbs. of straw or haulm for both chaff and litter; and calculating that quantity of each species of grain to be worth 9d.,* hay at 65s., and straw, or haulm, 20s. per ton,† on the farm—which may be about the present home value of the best qualities in most places—the cost of feeding and farriery would be:—

One horse Summer soiling	{ 20 weeks, 140 perches, at 9d. 2 qrs. oats 24s.	{ 5 5 0 2 8 0	7 13 0
One horse winter-feeding per week.	{ Corn 10lbs. per day, at 9d. Hay 1½ truss, 19½d Straw 1½ cwt. 1s.	{ 0 5 3 0 2 5½ 0 1 3	
32 weeks, - - -	0 8 11½	= 14 6 0	
Shoeing and farriery, - -	- - -	1 10 0	
		<u>£23 9 0</u>	

The annual charge of maintaining a single horse being thus ascertained, there remains to be added to the collective expense of the team, the interest of the capital sunk in their purchase, and in that of the implements for their use, including a wagon and carts, with their gear; and allowing these to cost £140, and the horses and harness, one with another, to stand in £26 each, with ten per cent. for repairs and deterioration of value, the whole account will appear thus:

Maintenance of 5 horses at £23 9s. each, - - -	117 5 0
Interest on £270, cost of teams and implements, at 5 per cent. £13 10 0	
Repairs and deterioration of ditto at 10 per cent. - - -	27 0 0
	40 10 0
First carter { weekly wages, 31 5 0 { annual wages, 10 0 0	
Second do. { board at 6s. per week, - - -	15 12 0
	56 17 0
Stable and contingent expenses, - - -	10 0 0
	<u>£224 12 0</u>

Labor.

The annual labor of a man and a pair of horses, with the necessary implements, will therefore cost £99 16s. 2d., or, throwing fractional parts aside, 6s. for every working day; but, as many days occur on which they are only half, or not at all em-

ployed, more than five days in each week, or 260 in the year, cannot be calculated on, which gives nearly 7s. per day, as the actual expense; and presuming them to be adequate to the cultivation of 40 to 60 acres, the tillage in each case will cost—

89£. 16s. 2d.	{ 40 acres = 2£. 5s. 0d. 50 " = 1 16 0 60 " = 1 10 0	} per acre.
say 90£.		

It will perhaps be objected, that as all the other work of a farm, such as statute-labor, carriage of materials for drains, repairs, &c. is also performed by the same teams, the entire charge should not fall upon the tillage; but, as all those operations are incidental to the cultivation of the land, they may, in fact, be regarded as forming part of it, and any separate estimate would not alter the total amount of the annual expense. Whenever it may be material to ascertain the actual cost of any specific work, the time it occupies being known, the calculation can be readily made according to the above valuation; and farmers would find it useful in enabling them to form a correct judgment on many points of great importance were they to make out an account of the actual expense of their teams, and to charge each day's work against the particular object on which it was employed. But in calculating the cost of the tillage of any one field, the mere charge of each day's ordinary work would be a fallacious guide; for that would only show the labor actually expended on the land without any share of the incidental labor of the whole farm: in such estimates, therefore, the annual expense of the team must be divided by the number of days consumed in tillage only; and supposing that to amount to but two-thirds of the entire labor, it would follow that, when each day's labor throughout the whole year costs 7s. the charge for a day's ploughing should be 10s. 6d.

The daily labor of a team must necessarily be regulated by the manner in which it is employed, as well as by its strength. In some of the southern and midland counties, the carters who generally sleep in the house, rise at four in the morning, feed, clean, and harness the horses, get breakfast, and are ready to go a-field at six o'clock, or after seven in the winter, when they work till two, thus making at the utmost a yoking of eight hours. When the horses return to the stable they have a little hay given to them while their attendants have dinner, by which time it is past four, when one of the men curries, feeds, and litters them down, while the other fetches their provender, either green or dry, and usually finishes his evening by a lounge at the smithy, either to get the ploughshare pointed, or to have some talk with his fellows, until the hour of eight leads him home to supper. Throughout the north, however, the usual hours of work are, in the spring and summer, from six to eleven, and from two to six, or seven, allowing the intermediate three hours for rest and feeding: in winter, at the utmost from seven to four, with one or two hours' rest at mid-day; though, at that season, it is a better practice to finish the day's work, without returning to the stable, at one bout of seven hours, during which the horses may get a feed from their nose-bags, while the ploughman takes his lunch, which he carries with him to the field. The common calculation is, that, taking the year round, an acre of land is thus ploughed in a day; and, generally speaking, this may not be wide of the fact; but the exact

* See note, p. 145, but those are assumed as the market prices; here they should be lower.

† In point of fact, no charge should be made for straw when it is not allowed to be sold; for, if not eaten, it must be consumed as litter; and when charged to cattle, it must be again allowed for, in account, as dung.

‡ The estimate of wages and board for each of the men is taken between the highest and lowest rate; for out-door and in-door servants were both kept either in, or out of the house—the amount, at a medium rate, would be nearly similar.

quantity, and the requisite number of horses must depend upon the nature and condition of the soil; the season; the way in which the work is performed; and the sort of cattle employed. Notwithstanding the broad assertion 'that two-horse ploughs are fully adequate to the tillage of any soil, however heavy,* it is certain that there is land in the Weald of Kent, and the adjacent similar districts, so exceedingly stiff and wet, that four powerful horses, or six strong Sussex oxen, are sometimes brought to a stand still in breaking it up;† the mode of ploughing; too, sometimes requires that the horses should go at length, in which case three are hardly more efficient than a pair abreast; and it is well known to practical men that, even with apparently proportionate additional strength, an acre of stubborn clay cannot be broken up in the same time as a ley of friable loam. Much ingenuity has been exercised to facilitate the execution of field-labor; various forms of the plough have been constructed to operate with less resistance, and the work has been executed by the application of less power. This is, no doubt, a great improvement, when the purpose can be equally well attained. It is pleasant to see a ploughman conduct a pair of well-trained horses to the field, and in a masterly manner perform the work which formerly required the aid of an awkward plough-boy and a number of unwieldy animals; and when the implements are good, and the ploughman intelligent and dexterous, this, no doubt, may be done. But it has been well observed, by a writer of great experience,‡ that 'fashion overrules judgment, and too ill-appointed animals are often expected to perform that which is sufficient for the most powerful; the surface is slightly scratched, attention to preserve the depth of the soil is disregarded, and the progress of cultivation and fertility retarded.' Adequate force should be employed to stir the ground to such a depth as a healthy vegetation requires; the breadth as well as the depth of the furrow, too, and the pace at which it is turned, govern the quantity that can be ploughed in a given time. The ground gone over in ploughing an acre is, with a broad furrow-slice, about eleven miles, or with one of eight inches, twelve miles and three furlongs, exclusive of turnings: and it has been ascertained, that a team, walking at the different rates of one and a half and two miles an hour, will plough the following quantity of a medium soil, to the depth of five inches, nine hours:—

Inches.		A. R. P.
Breadth of furrow 8	at 1½ miles per hour	1 0 0
9	" "	1 0 20
8	2 " "	1 1 10
9	" "	1 2 0

The difference in the quantity ploughed in these instances clearly demonstrates the value of action in the horses; but it must at the same time be observed, that the distance travelled at the slow pace

* Quarterly Journal of Agriculture, No. XI. p. 714.

† Kent Report, 2d edit. p. 20. Surrey Report, (Stevenson's,) p. 195. In some of the red clay land, in the Newbury district of Berkshire, five horses find hard work in turning up three-quarters of an acre in a day. Berks. Report, p. 119.

‡ John Naismith, Esq., part iv. No. i. of the second vol. of the Appendix to the General Report of Scotland.

is only twelve, while at the quicker rate it is sixteen miles; and that a ploughman must possess more than ordinary strength and dexterity to go through that degree of labor, and perform it well; for although he may rest himself occasionally by means of the plough tail, yet that is always at the expense both of the cattle, and of the regularity of the work. Mr. Parkinson mentions an instance of an Irish ploughman who, in a medium soil, and with a nine-inch furrow, turned over at the second ploughing, with a pair of horses of the heavy dray kind, 1 acre and 20 perches (Irish measure) in six hours and ten minutes, which is at the rate of nearly 2 acres 2 roods in eight hours; the horses must therefore have walked during that time at the rate of three miles an hour; but he admits that no horses, with any keep, could have maintained such daily labor for a continuance.* On the whole, therefore, it may be concluded, that an acre and a half is the utmost that can be ploughed with a common furrow, on any soil; and that on an average, from an acre, to an acre and a quarter, in summer, and three-fourths of an acre in winter, may be considered as the day's work of a team; the strength being in proportion to the land.

MR. CURWEN'S DIARY OF HIS HARVEST LABORS, IN CUMBERLAND.

[It is not with the expectation that our readers can derive instruction for practice from the following diary, that it has been selected for their perusal. Harvest in Virginia is so widely different in every respect from harvest in the north of England, that scarcely any thing usual or proper in the one, would be fit for imitation in the other. The climate and unusual degree of moisture—the time of year—the reaping (or "shearing") implements—the kind of labor, and the manner of its application—all are different in that cold and dripping region, from ours: and with our views, it seems a wonder, under such circumstances as are narrated, that all the wheat in the country was not lost, instead of being generally well saved. But this very difference of our circumstances from those here described, will lend some interest to the statements—and there is another thing that will serve to increase the interest to most readers, and it is this particular to which we especially invite attention. The pleasure which will be found in the perusal of this diary is almost entirely owing to the minuteness of the details. And if even a slight interest is thus produced, concerning a locality and circumstances altogether strange to us, much greater would it be, if as minute a statement was presented of a well conducted harvest in Virginia. And such a diary, would not only give pleasure, but instruction, in the best and most effective form.

It is scarcely necessary to state that Mr. Curwen was one of the most intelligent and distinguished farmers of England. This diary is extracted from his report to the Workington Agricultural Society of which he was the President.]

"*Park wheat—22 acres.*" On the 28th of August, this crop was begun to be cut. It was less injured than I expected from the situation of the

* Parkinson on Live Stock, vol. ii. p. 132.

ground, which I attribute to its being drilled at twelve inches distance. Some parts were laid, but generally it was upstanding. Considering its low situation, it must be always subject to risk. If this had not been sown so particularly thin, the crop would have been entirely spoilt. There were 1135 stooks, or 51 upon an acre. The clover plant very good, and extremely clean. This crop was taken off beyond all expectations, and will be the first wheat in the neighborhood. The necessity of being most particularly attentive to cleaning and picking small potatoes, is apparent here; for there are still a great deal more growing than there ought to have been. They not only offend the eye, but injure the crop.

"Gilderskill—30 acres.] One part (about five acres) was very much laid, and had a great number of black heads. I did not observe, however, any appearance of mildew. The wheat had been much injured by the frost. Sheep were put upon it for a few days; and where they had fed, it was much the best. It had been too proud before the sheep were turned upon it, and they did not like it. The season, however, became so wet, that they could not have been kept long upon it. The highest part of the field was extremely good. There were 1105 stooks, or 36 per acre. This wheat was so ripe, that had there come any wind before it was cut, there must have been a great loss from the shake.

"Moor Close—42 acres.] The two fields which were quite a new creation, produced a very good crop. Some few acres were laid and injured; but generally it was most productive, and had in one 802 stooks, and in the other 1058; and some parts of it turned out as fine grain as I ever beheld. Had the season been favorable, this would have been a most surprising crop. Those who envy farmers their success, let them look to this season, and see the ruin which has threatened their whole produce; and unless the latter part of the season becomes favorable, I do not know how farmers upon wet ground will be able to support their stock. The turnips and cabbages have made no progress for the last three weeks, and it can scarce be hoped they will gain the weight of half a tolerable crop.

"The advantage of being near a town is very great. I was able to muster, without giving extra wages, 220 persons. Women have 2s. per day, and work between nine and ten hours—men 2s. 6d. In difficult seasons, to be able to cut between 30 and 40 acres a day, greatly lessens the risk, and is an additional reason for having lands near towns under tillage.

"August 30th.] The incessant rain for five weeks saturated the ground to such a degree, as to put a stop to the growth of clover on wet soils, where it had been late cut. In some parts, the roots appear to have been affected, and the clover seemed to have lost its feeding quality. Plants appear to require the sun to bring them to perfection, as much as the earth does the heat of his beams to promote their growth.

"For one fortnight, the experimental cattle all lost weight, and the milch cows gave less milk. I was compelled to suspend soiling, and turn my cows upon the aftermath, to give the clover time to get a growth. What was first cut had made such progress before the wet came on, that it was not materially affected, and cut uncommonly well.

I attribute this to the plants covering the ground, and guarding the roots. The cover also kept it warm. The same observation is applicable to the pastures that were earliest cut. Turnips and other roots that were very forward, have suffered least. This unexampled season has been attended with difficulties I never experienced; and, unless the month of September turns out favorably, the distress will be general. The wet has arrested the growth of the turnip. No crops come up better, or appear more promising. The rain seems to have suspended the vegetative power of the earth, and checked the growth of plants of all kinds. Nothing could be more discouraging than this day. I have never known the ground wetter, at any season. The cabbages were equally stopped in their growth.

"I was not previously aware of the full extent of fortitude and patience required to make a good farmer. Philosophy is not an acquirement of learning alone: it is one thing to argue well, and another to adopt the maxims of wisdom as the rule of practice. In the midst of one of the violent showers so common in this climate, I was glad, with a friend who was along with me, to take shelter in the house of a small farmer. Presently after our arrival, the master and his servants were likewise driven in. The children received the parent with delight, and he returned their caresses. The felicity their endearments inspired, seemed at once to restore the calm and tranquillity of his mind. Domestic sunshine disarmed the merciless peltings of the storm. Its injuries seemed no longer felt or regarded. Struck with surprise I was resolved to prove whether this was the effects of indifference or real magnanimity. I began, with some asperity, to rail at the weather, which was answered by the good man with great composure, 'that God never sent a crop without a season to get it in.' And having made this reply, which comprised all his knowledge and belief on the subject, continued his merriment and innocent pastime with the children. I know not what effect the recital may have on others; but on my friend and self it acted as an electric shock. We could neither refrain our admiration: and the train of ideas that flowed from it led us to this conclusion, that practical wisdom is the offspring of virtue, and the twin sister of happiness.

"A twelve acre field of wheat at Moor Close, which had been fed with sheep, cut uncommonly well, and was, in general, very heavy, and an excellent grain. There were 540 stooks, or 45 per acre.

"The last of August, and the first two days in September, were a great blessing to the country. From the appearance of change on Saturday the 2d, I persevered cutting till it was nearly dark, and thereby saved a part of a field, very ripe, and so exposed, that the high wind which came on in the night would have greatly injured it. I own I am often surprised with the confidence I see placed in a climate so uncertain as ours. For myself, I disclaim all trust which can be avoided by exertion.

"September 4th.] Cut one field of two acres from fallow, which had 105 stooks—the wheat uncommonly good. Much rain in the night, with partial showers during the day. I discovered that in many parts of the spring wheat there were a great number of black heads. These are more

apparent as the spring wheat ripens. The few fine days have already made a sensible difference in the appearance of the turnips. Where the stitches have been opened by the plough, I have no doubt it will be proved that the earth has recovered part of its natural heat.

"September 5th.] The weather relapsed. The warm gleams of sun were very injurious in making the corn heat and sprout. This was a heart-breaking day to the farmer.

"September 6th.] Being wet in the morning, the afternoon broke out fine, and did infinite benefit to the grain which was cut. Lodged corn will now become every day worse. The first loss will be found the least. It is expedient to cut what is in that state, and take the chance, by exposing it, that a part may thereby be saved. Cut above 500 stooks.

"September 7th.] In the night there had been violent thunder showers. An unpromising morning. It cleared up at ten o'clock; and I began cutting spring wheat, a very moderate crop, something better than the last year. I doubt much whether I shall ever attempt sowing it again; certainly not the kind common in this country. Early in the afternoon, a very heavy shower, which put a stop to any further cutting. The wet and heat is most injurious both to the lodged and the cut grain. Seeing the probability of a change, I was fortunate in getting all I had got cut both this and the former day hooded. In such a season, the farmer has the choice of difficulties: to wait is destruction—to proceed is injurious. Prices will remunerate the farmer; but what will be the situation of the laborer and lower orders, who make no provision for a season of difficulty? The present prospect is as gloomy as possible.

"September 8th.] A moist day, and not a breath of air to dry the ground. Cut two fields of wheat, with four acres of indifferent oats. The warmth of the weather, together with moisture, is most destructive to grain. Since the ploughing between the stitches, the turnips have made some progress, and recovered their color. Led and thrashed the winter barley, which, in the moist state of the straw, was attended with difficulty. The situation where it grew was very low, and unfavorable for barley: a part had been lodged, and suffered. Harvest demands redoubled exertion: an error or omission in this cannot be retrieved. Few can hit the happy medium, uniting energy with sound discretion. To accelerate too much in carrying grain, is subject to loss: to omit a tolerably favorable opportunity may be equally so. In such a season as this, the farmer has only a choice of difficulties. Anxiety to get forward is the rock, I feel, I have to guard against. After endless plague, vexation and loss, I got my hay out of pike into stack. It had suffered less than I expected, though much more than I wished, and has proved a very light crop. Fortunately, disappointments are soon forgotten; and however adverse seasons may be, upon every failure hope still renews her golden promises. For four days I have anxiously expected to be able to secure a part of my crop, having upwards of 6000 stooks cut.

"September 9th.] The morning was dubious, but soon cleared up, and became a fine harvest day. Began to carry rather too soon. The height to which the stacks are elevated, gives them a great advantage. Employed 150 shearers. A few

acres of the wheat in Mealrigs, was much disfigured by docks. I cannot account for it in any other way, than by supposing the seed was brought in sludge got from a tarn, into which the drainage of the town runs: this was used as a top dressing, when this part of the field was under clover. I stacked 2000 stooks. In the state of the weather, this must be considered as particularly fortunate.

"Sunday, September 10th.] In the precarious state of the weather, that which would, in all other cases, be inexcusable, becomes an imperious duty. I hesitated not, this day, to employ every hand to secure the grain which was ready for carrying. The preservation of life is a duty strictly enjoined us. That cannot be deemed a profanation of the Sabbath, which proceeds upon the principle of preserving what is necessary for the existence of a number of our fellow creatures. Were it a question of individual gain, it ought not to be done. In seasons when the weather is generally good, I should not recommend it. But after fifty days, without there having been twenty-four hours fair, the omission might hazard an immense loss to the public; and no argument can be fairly deduced from this, to justify any neglect of religious duties. Led 1500 stooks. At twelve o'clock it came on again to rain, and superseded all further proceedings. I was glad to see the general exertion that was made by every farmer around to save his crop. The afternoon again cleared up; and in common and ordinary seasons, one might reasonably hope a fine day would succeed. The wind has never been steady to any point for fourteen hours; and much of the rain has had the appearance of thunder storms.

"September 11th.] The return of sunshine, and a fine drying wind, reanimated the farmer's hopes. All was gratitude. Past miseries vanished. The joys of a good harvest were anticipated. The difference between the state of the grain, at seven o'clock in the morning, and at six in the evening, was scarce to be described. Most melancholy was the appearance when the reapers began. The wheat was not in a state to bind till the afternoon. Two hundred people were employed in the field between the Schoose and the town. All was gaiety—so soon are sorrows forgotten. The impatience of the day before had led to the attempting too much; and a part of the stacks was obliged to be opened to prevent losses. The wind afforded an opportunity of thrashing. Ninety Winchester, or thirty Cumberland bushels, were dressed in the afternoon—the grain very good.

"Commence sowing the newly enclosed common to-morrow, which should have been done three weeks sooner, if the season would have permitted. I do not know I ever felt more real pleasure than I experienced this day. The melancholy presages that the weather had inspired, and the apprehensions resulting from the fear of scarcity, gave way to the more pleasing hopes of abundance. Good humor and cheerfulness animated the numerous group. To save and secure the crop seemed the prevailing sentiment of every breast. I passed eleven hours a spectator of this scene. If I had wanted individual causes of gratitude and thankfulness, it would have been difficult to have avoided sharing the content and happiness that were so widely diffused.

"September 12th.] A continuation of fine wea-

ther, with a drying north wind. Led 1500 stooks, and thrashed three hundred Winchester of the Park wheat, which turns out admirable. Began sowing wheat. Thirteen pair of harrows upon the new enclosure. Employed a hundred and sixty persons shearing. The ground still as wet as during any part of the winter. An evident improvement in the turnips. The country resounds with the cheerful voices of the harvesters. Every quarter presents a scene of activity and bustle. One very principal object in detailing the transactions of harvest is to show to those who have not the experience, what are the difficulties, what the anxieties, which farmers must encounter. Though honey may be extracted from farming, it is very often gathered off the point of the thorn. Every kindness and indulgence is due to the industrious farmer.

"September 13th.] A tolerable day; but gave early appearance of change. Cut out a 16 acre field, adjoining Gilderskill, which had 1021 stooks, on clover lea. It was but a moderate crop. The Schoose field, 60 acres, had 4340 stooks, or 72 per acre, after potatoes. My friend, Mr. Ponsonby, was solicitous the grain should stand till the Meeting, as the most convincing proof that could be given of the excellence of the drill husbandry. Stacked eight hundred stooks. Reduced my shearers to eighty, as some part of the spring wheat is scarce fit to cut. Employed forty boys weeding wild mustard from the cole. The difficulty of fixing the attention of children is great. Force cannot be applied, as there is no delegating such a power. I hit upon this method to expedite the work. Four leaders were selected; and each had ten boys under him, who were chosen alternately by the captains, and a shilling was to be given in the morning and afternoon, as a reward for that company which performed the most in the best manner. Work at once changed its nature. Emulation fired each youthful mind; and that which, the day before, was an irksome labor, became a work of inclination. It was surprising what was done. As the best deserving, where all were meritorious, could not be decided, it ended in each company receiving a reward, over and above their wages.

"The farmer, whose servants have his interest at heart, possesses a real treasure. Hours ought not to be regarded in seasons of difficulty. A crop may often be saved by continuing work a few hours beyond the regular fixed times. And this is no more than justice; for, how often does the weather interrupt the regular portion of labor? An honest man keeps this in mind, and amply compensates for it in harvest and seed time.

"September 14th.] A wet day. The advantage of being situated near to a town is very considerable. When the shearers cannot work, the farmer incurs no expense. In places distant from towns, where the harvest people are hired into the house, it falls very heavy, and adds much to the expense and difficulty of a bad season. Finished sowing 72 acres of wheat. Could the drill have been employed, it would have saved one pound per acre.

"September 15th.] A fine morning but no wind. The ground has, hitherto, dried very little. The distress of farmers cannot fail of being great, from the prodigious failure of the turnip crop. I do not flatter myself with seeing mine average ten tons

per acre. Had the season proved tolerable, they should have reached near forty, from the condition of the ground, and the pains that have been taken with it. It is greatly to be feared the potatoes will, in many places, likewise be a very defective crop. Combining these two things, I look with very considerable anxiety of mind to carrying on my dairy, which is now become a very essential source of support to numbers. In order to make every possible provision for supplying the defect, I have ordered thirty tons of oil-cake. This, when ground and boiled with chaff and cut straw, must be the main support of my milch cows. This was the warmest day, with the most powerful sun, we have had for many weeks. The ground wants heating to produce vegetation. In no year within memory, was there so poor an after-math, which is entirely owing to the ground being so cooled by the continual rains. Stacked eight hundred stooks from Mealrigs. Employed six pair of oxen, ploughing single, which, though difficult at first, will soon be accomplished.

"September 16th.] A great fall of rain during the night: Cleared up at ten. Employed a hundred and twenty shearers in the afternoon. It takes five women, on an average, to cut an acre per day: Four good shearers will do it. Drilled grain is much easier to cut than broadcast. The hopes of any continuance of fine weather grow daily less. I now lament I had not begun to house earlier the day before. If the night be fair, I shall feel myself compelled to employ all my strength to-morrow.

"Sunday, September 17th.] Six o'clock, the morning unpromising. Began at seven to make every exertion, as there was a strong appearance of change. The rain kept off till four, when we had fortunately concluded the carrying 3000 stooks of wheat, which finished the Schoose field. The order, regularity, and decency of those employed, marked the work as one of necessity, not of choice. On such occasions I incur a debt of obligation. Whatever remuneration I feel it proper for me to give, is bestowed as a free gratuity. Those who rescue the crop, have a strong and undeniable claim upon it, in case of necessity. The heat of the earth has advanced some degrees in the last two days.

"September 18th.] I shall here conclude the details of the harvest, already, I fear, extended too far. I have given a faithful representation of my own feelings, from whence may be calculated what must be those of farmers, who have more at stake than credit. Frequently, their whole means are embarked, and dependent upon their crops. If it has the good fortune to create an interest and consideration for this most respectable body, it answers the purpose I have in view. The exertions of yesterday saved 3000 stooks of wheat. The deluge of rain which has fallen this day, must do most material injury to the grain. With resignation and hope, I still look to a return of good weather, not only to save the crop, but to prepare for that of a succeeding year. It would be distant from my wish to deter any one from the practice of farming, by a recital of its difficulties. Let it be remembered, there is no honor without danger; no pursuit exempt from anxiety and disappointment: These give zest to success. Uninterrupted sunshine, ardently as I now pray for it, would prove equally destructive.

"September 19th.] The violence and length of

the rain, on Monday, produced the greatest flood that has been known for fifty years. The damage was prodigious. Grain of various kinds was strowed over the beach, from Workington to Harrington; and a great quantity was picked up, and carried off. The break of my wind-mill had not been secured, and it was set to work, and not discovered till it had done considerable damage. The loss was something; the mortification infinitely more, as it prevented its being shown at work during the Meeting.

"*Sunday the 24th.*] Secured above 3000 stooks of grain. The 25th, finished shearing the small quantity of wheat remaining. Led all that had been previously cut. The conclusion of harvest was celebrated by all my work people, at the Schoose. Upwards of three hundred of both sexes spent a few hours in great festivity and good humor; rejoicing that the labors of harvest were concluded, and grateful for the bounteous store which secures abundance to those by the sweat of whose brow it has been produced."

[To this we will add part of the comments of the conductor of the Edinburgh Farmer's Magazine, upon the report and diary—who, it is believed from various indirect proofs furnished by the general work, was that excellent Scottish farmer, Robert Brown, of Markle.]

The next remark which we offer, is with regard to the carrying of corn upon the Sabbath day; a practice not only contrary to the laws of God and man, but also hostile to the welfare of the state, and the truest and best interests of mankind. The President pleads necessity as an excuse for working upon that day; but this excuse cannot be allowed, unless circumstances be such as to demand immediate attention. If a house is on fire, every person knows that prompt exertion must be used to quench the flames, otherwise destruction to the premises would inevitably ensue; therefore, none will find fault with working on the Sabbath, in that case, or in others of like necessity. There is no occasion, however, to argue the point; the dullest capacity being sufficiently able to distinguish between works of necessity and mercy, which may be lawfully performed on the Sabbath, and those which ought to be deferred till another occasion. But, putting the morality of the question aside, we would ask Mr. Curwen, and other advocates for Sabbath days' work, what would become of the great body of the people, not only those who work for their daily bread, but also those regularly engaged in business, were not their bodies strengthened by rest, and opportunity afforded for instructing their minds, on a day hitherto considered, in this country, as set apart for these purposes. The bulk of mankind, even *with* the Sabbath, are ignorant enough; but, *without* it, they would become not much better than the brutal part of the creation, casting off all those restraints which serve to make them good subjects, and good members of society.

We are quite aware that the term of canting may be applied to these remarks; but any thing of that nature will give us small uneasiness. It may be added, that the plea of necessity urged by Mr. Curwen, for carrying corn on the Sabbath, cannot be allowed in our court as a relevant one, as, besides the moral objections already stated against the plea, we must whisper in his ear, that the writer of this article harvested many more

acres of corn last year [1809] than mentioned by Mr. Curwen, and with far less strength than kept by him, without spoiling a single sheaf thereof. In a word, if the fixed ordinary days of the week are well employed, there is no occasion for working on the seventh.

HOW TO BUILD WHEAT SHOCKS.

To the Editor of the Farmers' Register.

The different operations required for our wheat harvest, are the most important that most of us have to perform, and in which, bad management is followed by the most certain and heavy losses. Yet there is no branch of farming in which there has been greater difference of operation, on different farms, and at different times on the same farms—and in no other has the introduction and dissemination of improved processes been more slow. The cause of this is to be found in the supposed necessity for every farmer attending closely to his own harvest, and the great inconvenience of any one's leaving his own business, even for a day, to ride 10 miles to see the harvest management of some one more experienced. I now know as to myself, that I was sustaining losses for years together, from ignorance in various particulars, which might have been easily avoided by giving a single day to viewing the operations of some better farmer. One of the things by which I suffered most was the want of knowledge of the proper mode of building "shocks" capable of withstanding the entrance of rains. After having been losing much in labor, and still more in grain, for sundry successive harvests, I was indebted to the late John Minge of Charles city, (one of the best practical farmers in our country,) for such verbal instructions on the subject, as served in a great measure to remove my difficulties, and to prevent the losses caused by bad shocks. As there are still very many who pursue as bad a plan as mine was formerly, and who are too indolent to learn by going to see better management, I will try to point out, for their use, the defects of the one, and the advantages of the other mode of building shocks.

The plan which I formerly adopted in conformity with the usage of my neighborhood, and which still prevails on many farms, may be described generally as follows: Sheaves were set up on their "buts," as close together as they could be pressed, and with the heads a little inclined to the centre of the intended shock, until a circular foundation was formed, about eight feet in diameter on the ground, and perhaps two feet less across the flat top, formed by the heads of the sheaves. On this body, or foundation, a conical top or roof was built in this manner. Four sheaves were laid flat on the top, their heads meeting and crossing on the centre, and their butts jutting outside of the upper edge of the foundation—the four forming straight lines, and right angles, so as to divide the circular top of the foundation into four equal parts. Four other sheaves were then laid in like manner, but so as to fall on the middles of the vacancies left between the first. As the tops of all crossed the central point, of course their repeated doubling there produced a rapidly rising peak. Other sheaves were then laid so as to cover all the openings between the first eight, and still meeting at the peak, as long as sheaves would stand as placed, and so as to shape the roof, and

its point in the best manner. Some of the most careful placed over the peak a cap-sheaf; but this additional trouble added very little security to a shock not properly roofed. A cover like this cannot prevent a heavy rain, nor even a slow soaking rain, from penetrating, although moderate rains may be partly thrown off, by the inclined portion of the sheaves, and the water which penetrates may dry before it sprouts the wheat. In the latter circumstance consists the safety of bad shocks—for they let the water out, by evaporation, as readily as they let it come in, by the tendency of its weight; and in our hot and sunny climate, wheat will not soon sprout, that is exposed to the access of sun and air, as well as to rain. Every wetting however, is injurious, though not continued long enough to start the sprout.

The principle upon which a shock is properly covered is altogether different from that of the foregoing plan, and is similar to that of covering a roof with shingles. The foundation is begun with three or four sheaves set up so as to form a little cone—that is, the butts on the ground set out so as to make a base broad enough for them to stand when the heads are brought together, (as they should be) to a point. Other sheaves are set up in the breaks of the first, placed firmly on the earth, and the heads inclined to the central point. This brings the base to a small circle, and the heap to a conical form. The builder (and there should be only one to a shock, to secure good and equal work,) now continues to add to this, by placing other sheaves on the ground and against the breaks between the preceding course, and thus going round the circular heap, until the foundation is large enough. The butt of every sheaf should be well pressed to the earth, when placed, and its top pressed to the central point, with increased force, as the size of the heap will bear the pressure without danger of its being moved. When the foundation is finished, instead of being flat topped, it rises to a central point, and its whole profile is somewhat in the shape of the old fashioned Dutch or "hipped" roofs of houses—the sides of the sheaves forming the lower slopes, and the heads, the upper.

For covering the shocks the smaller sheaves should be reserved, and none very large there admitted. The first course of the cover is made by striking some of the stubble ends of the straw upon the band of the outer sheaves of the foundation, so that some straws go within the band, and thus hold the sheaf where placed. The circle is completed by sheaves so placed, the butts close to each other, and the heads leaning inwards towards the middle of the shock. A second course is carried around in like manner rising on the first, and resting on and within the bands of its sheaves. The point is now nearly-reached and formed; and what it wants, is given by using the smallest sheaves. The heads of the last only are exposed, and they will be generally not more than four or five sheaves: and these are protected and secured in their places, by a cap, formed of a large sheaf turned with the butt upward, and the heads so spread open as to hang over and all around the sides of the peak.

If I have succeeded in making my description intelligible, it will be seen that such a shock is completely shingled with sheaves, and that the straw of each course overhangs and protects the

heads of all below. Of course it is not meant to be understood that such a covering is perfect: but if rain gets in at any opening, the course of sheaves below will tend to throw it out at the eaves. Indeed, if the body of the shock has been well put up, and retains its position tolerably well, it will require unusual bad weather to produce any noticeable damage.

Now, Mr. Editor, it may be said that I have used many words about a small matter, and to explain what every good manager knows as well, or better than the writer. Admitting all this, my labor may be useful to very many other persons—and every one who may thereby learn to save even one or two shocks of wheat in the approaching harvest, which would otherwise be lost, will be at least a gainer of as much as the cost of his year's subscription to the Farmers' Register.

May 22d, 1834.

Q.

For the Farmers' Register.

The following remarks for the Register were written about twelve months ago, but being mislaid until after harvest, it was then thought more timely to publish them just before that season.

HARVEST MANAGEMENT.

The communication under this head in the first No. of the Farmers' Register, contains too much interesting information, not to have attracted general attention; but while it contains many useful details, which are at once recognized as sound and sensible by every practical farmer, your respectable correspondent, is laboring under one *important error*; and as it is an error generally prevalent in lower Virginia, as well as other districts, and I believe extensively mischievous; I feel myself called upon by the interest of our common vocation, to give the full benefit of a corrective, tested by several years experience, to your correspondent, as well as all the other readers of the Register. The error to which I allude, is the custom, defended in "Harvest Management," of giving ardent spirits to our laborers.

This practice is sustainable upon no grounds, more defensible than mere custom. The argument once used, that ardent spirits imparted strength, has been laid aside with other vulgar errors. Medical science has now established as an axiom, that preternatural excitements are followed by proportional degrees of debility, and that the system in a state of collapse, is more liable to diseases. Of eighty, the whole number of the medical faculty of Boston, seventy-five have concurred in the opinion, that the use of ardent spirits is not only unnecessary but injurious, and I believe very nearly, if not an equal proportion of the medical faculty of other cities who have been consulted, have come to the same conclusion. In short, wherever impartial and enlightened investigation has been directed to the subject, in the course of the great reformation, now happily pervading almost every part of our country; the result has been the exposure of the absurdity of the once received opinions on this head, attributing the most opposite and contradictory effects to the same bewitching cause.

To the lights of science, have been lately added the practical discoveries upon this subject, of the American Temperance Societies, embodying in their reports a mass of evidence and facts, which

carry conviction, I believe, I may safely say, to ninety-nine hundredths of mankind who give them a fair examination, that the use of ardent spirits is unnecessary, injurious, and demoralizing to all classes of men.

My own experience and observations have brought me irresistibly to the same conclusion. For upwards of twenty years preceding the last four, I used from sixty to eighty gallons of spirits in harvest yearly. I then rarely got through the season without some accidents of a more or less serious character. I had several cases of wounds, from which the sufferers were long recovering—many cases of spasm, from drinking cold water after previous partial intoxication; and almost always more or less disease immediately after harvest. It is true, the period was marked by more noise and boisterous mirth, but it was attended with more broils and irregularities, often leading to the necessity of resorting to punishment. During the prevalence of this pernicious custom on my estate, it required from five to six days after harvest, for the laborers to recover from what I then thought, was the necessary effect of the excessive labors of the season, but which subsequent experience has proven, was the weakness and debility consequent upon the unusual excitement of ten days or a fortnight's use of ardent spirits; thus proving to demonstration, that the cheerfulness purchased by alcohol, must be paid for in bodily strength; to say nothing of the punishment often made necessary by its intoxicating effects.

Since I have discontinued the use of ardent spirits in harvest, mark how the scene has been changed. I have saved my grain in better time and in better style, than I ever did before—I have less sickness—fewer accidents—I have no broils or irregularities—my people are as fresh, and able to perform as good a day's work the next after harvest, as any day in the year; and what is still more interesting, (under the system of measures, of which abstinence from the use of spirits in harvest is an indispensable part) nine-tenths of my laborers have become faithful members of the temperance reformation; and this state of things has been brought about by their own consent, without the use of any other means than kindness and persuasion; and furthermore, I verily believe, the following recipe will prove infallible in producing the same effects wherever it is fairly tried:

Let each master take to himself as much self denial and christian resolution, as to enable him to join the temperance reformation; and then condescend to explain its advantages to his own people. The fullest success will surely follow; for there is no yeomanry on earth more docile to moral instruction, than the negroes of Virginia, if their masters will become their teachers.

Total abstinence from ardent spirits, I consider of so much more importance in my "harvest management," than any thing else, that it will seem like an inversion of the proper order of things to advert to other particulars; but, it may not be amiss to mention here, that I have substituted for the spirit formerly used, an equal measure of molasses, which being itself a nutritious article of diet, as well as an ingredient in a cooling and pleasant beverage, is used by my people in the one way or the other, at their discretion. They are now loud and almost unanimous in their preference of it, to their former allowance of whiskey.

I hardly need add, that since so large a portion of my slaves have given up the use of spirits, I have remarked the most striking improvement in their moral characters.

ONE OF YOUR CONSTANT READERS.

TO PREVENT HORSES BEING GALLED BY THE BACK-BAND.

To the Editor of the Farmers' Register.

Powhatan Hill, 25th April, 1834.

I am reminded by the season of planting corn, to make the readers of the "Register" acquainted with a very simple and efficacious contrivance, to save our plough horses from galled backs. I have used the saddle which I am about to describe, for the last two years, a pattern having been made for me by a gentleman from Botetourt county. Since then, I have never had a mule's back cut by the back-band. My neighbors are adopting the expedient, and concur with me in recommending it highly. The sole objection is, that it may cause the slovenly practice of using a grape vine or a rope, in place of a proper back-band, as neither can injure a horse's back with this saddle under it.

The saddle is made of two pieces of oak about eight inches in length and breadth, and with the corners "rounded off"—thick enough to be substantial. The inner side is made convex to suit the horse's back, on each side of the back bone, where they rest. The two pieces are connected by two straps of leather, at each extremity of which are cross straps or loops, through which the back-band is inserted, and which lies over and presses upon the wooden sides of the saddle.

The back-band ought not to touch the back, so that the pieces must not be more than four inches apart. It is very light: oak is better than pine, only because it holds the tacks more securely by which the straps are fastened.

This kind of saddle may be in common use in many parts of Virginia, but I never saw it before I used it on my own farm. I dare say it is new to many of your readers—and my object will be accomplished if only a few poor mules shall be indebted to it for their hides.

ED. F. TAYLOR.

DRAINING.

To the Editor of the Farmers' Register.

Fairfax county, Va. May 20th, 1834.

I promised you some weeks past a communication upon the subject of ditching or draining land. Indisposition on my part, and delay in the surveyor, have operated to retard my purpose. My main drain is something less than 3000 yards in length, having the capacity to receive and discharge the spring and flood water from seven or eight thousand acres of land. 1800 yards were cut through a mill pond which was made by a dam not more than two and a half feet high, which is now put down, by the kindness of the owner. Much of the country around is precipitous and broken; the water from which brought great quantities of sand and mud into my drain, and often made it necessary to clean it out fall and spring. This alone was great labor. Thirty-three years have passed over me since I began the work, and I cannot say that it is perfect. A drain like this must have no angles in it; for they create eddies,

in which all washings will be left, and the work ultimately ruined. This important fact in draining I had to learn by experiment: and upon so long and crooked a stream, (and that a boundary) to straighten all the angles, and make the drain at my own cost and loss, was not exactly pleasant. As a short rule for making drains, let me say that they should be *straight*, and of *full* capacity to contain the water thrown into them, always taking care to begin at the outlet or lowest point. By measure and estimate, sufficiently accurate for all my purposes, I have not less than thirty thousand yards of water and fence ditching, fifteen-sixteenths of which is necessary to the drying and draining of my farm. Not less than one-quarter of all these *must* be scoured and cleaned every year. Like a gambler, I was drawn into this work by imperceptible degrees, and finally played on because I had already lost so much. Separately considered as a matter of profit, I am not prepared to justify such expensive works. Nevertheless they show young farmers that perseverance, with a very limited degree of knowledge and experience, will, in time, surmount what would seem to be insuperable difficulties. Though my land was once remarkable for its great growth of rushes, I believe it would now be difficult to find one. Clover and plaster operate well even upon that land that was covered 50 years by the mill pond. As for covered drains, I have made many, but they were very unsatisfactory: and I would not advise any to make them. No wet land will be benefited by plaster: but the same land made dry, if it had originally good constitution, will give surprising results—a young farmer, by the use of clover and plaster may feel his way into necessary draining: for wherever the land is diseased and unsound, from excess of water, plaster is as useless as sand. I will take this opportunity to say that I am not advocate for deep ploughing, but a decided one for deep stirring. Five or six inches deep for the plough, and then 10 or 12 with the coulter (including that which is broken by the plough,) is the best that I have any knowledge of. No land thus cultivated, will ever wash. It is a great defect in our laws that there is no way for constraining all who are benefited by expensive drains to do their proportion of the work. Nothing can be more just. Bonaparte in his "Code Napoleon," provided for this—but in a community like this, where the politicians rule, and are found at the head and lead of those whose interest it is to keep up a wide spread common, the waste and ultimate desolation of the country is a matter of certainty, and susceptible of mathematical demonstration. Since my agitation of this subject, I have been much amused to hear the little lawyers and political jaybirds chatter about "vested rights," and denounce the high handed aristocracy that would dare to claim the exclusive enjoyment of their own. Poor Virginia!—land of my fathers—land of the virtuous, the brave, and the patriotic—thy destiny may be paralyzed and arrested for a season—but, like the shorn and maltreated Sampson, time must and will restore thee to thy pristine powers and loveliness—and with "healing on its wings," it is already upon our border. To our highly respected General Assembly I would say, "Ye are the salt of the earth—take care of her rights—to her lap sooner or later you must all go—and for all that I know, must render to *her* some account of your

stewardship." The moral and political strength of every country can be measured by the condition of its agriculture.

Contrary to all my calculations, our young wheat promises well—I would rejoice to say the same of our currency: let us believe that "chastisement leadeth to wisdom."

I have planted for 3 years, 7 or 800 locusts each season, and expect to double that number in future. They are planted on ditch banks and turning rows. I would not give up my subscription to the Register for the best horse advertised in the Richmond papers.

Our oat crop is promising, and as I use this as a part of my preparation for fallow, it is not uninteresting; for it gives my horses a good support, and pays well for making the land ready for our wheat crop. Our corn is very unpromising, as it has been cut down twice by frost, and can, at best, do no more than give the produce of crippled plants. My free use of the coulter is all that gives me hope. Though planted early in April, the corn is not visible at many yards distance. I am, nevertheless, giving it the third stirring with the coulter, and the earth is in fine tilth to the depth of ten inches. Should the season become more favorable, all that I can do will be already done for the security of the crop. Our clover is the worst I have seen for 20 years.

I pray your correspondents to excuse my desultory and irregular communication—but trust they will excuse a sick man. I am in debt to them, and offer this, crippled as it is, as "part and parcel" of the currency of the times.

JEREMIAH.

THE QUAIL.

About thirty years ago, this bird was unknown in Canada. It abounds in the Upper Province, but has not yet appeared in the Lower. Its habits appear remarkable, although probably not more so than those of any other wild fowl, when carefully watched. A gentleman, of much patient research in regard to wild animals, who has been a resident in Upper Canada since the quails first made their appearance, happened to have above a hundred at one period alive, and took much pleasure in the evening watching their motions, where they were confined. As it grew dusk, the birds formed themselves into coveys or parties of twelve or fifteen in a circle, the heads out, and tails clustered in the centre. One bird always stood on guard to each party, and remained perfectly stationary for half an hour, when a particular *chuck* being given, another sentinel immediately took his place, and relieved him with as much regularity as any garrison could boast. It became a matter of further curiosity to observe how they would meet the extra duty occasioned by the havoc of the cook. For this also a remedy was found; and the gentleman remarked with admiration, that as their number decreased, the period of watch was extended from a half to a whole hour, in the same form, and with unfailing regularity. [The quail here mentioned is supposed to be the Virginian Partridge, *Perdix virginiana*, the quail of Europe, *Perdix Coturnix*, not being indigenous in any part of America.—EDIT.]—*Quar. Jour. of Agr.*

Diary of the temperature and state of the weather in May, observed at Shellbanks, Prince George county, 37 deg. 14 min. N. Lat.

Fair or sunshine, f—cloudy, c—rain, r.

MAY.	Thermometrical Sunrise.	Weather.	2 o'clock, P. M.	Weather.	Twilight.	Weather.	Change of weather during the night.
1	47	f		f	62	c	
2	49	f	72	f	63	c	
3	65	f		f	62	c	
4	49	f	72	c	63	c	
5	62	r		c	73	c	
6	50	f		f	72	c	
7	66	c			70	c	
8	62	r	67	f			
9	43	f	72	c	69	c	
10	51	c	67	f	61	c	
11	45	f	79	f	75	c	
12	65	f	75	f	68	c	
13	43	f	61	c	54		
14	42	f					
15	42	f					
16	38	f	61	f	56	f	
17	40	f	75	f	56	f	
18	46	f	85	f	72	f	
19			86	f	75	f	
20	65	f	85	f	76	f	
21	66	c	81	f	74	c	
22	64	c	88	f	79	f	
23	64	f	87	f	78	f	
24	69	f	78	r	73	r	rain all night
25	69	c	79	c	75	c	
26		c	71	r	72	r	
27		c	73	r	70	c	
28	66	c		c	71	c	
29	67	c		r	76	f	
30	67	r	86	f	74	c	
31	66	r		r	70	c	

EXTRACTS FROM PRIVATE CORRESPONDENCE.

CHEAT PRODUCED FROM WHEAT.

Orange county, N. C., April 30th, 1834.

As a slight compensation for the edification I hope to derive from your labors, I take the liberty of mentioning a fact which may tend to elucidate a point, on which I observe, you are more than skeptical: I allude to the production of *cheat* from wheat, or, rather, the degeneration of the latter into the former under some circumstances.

Some years ago I had a piece of grass land containing about four acres; about one-half of which was a steep and rich hill side, which was set in red clover and orchard grass; the other half, being the foot of the hill and a moist bottom, was in timothy. The whole had been mowed for hay for several years, twice annually; and was perfectly free from cheat and tolerably clear of other weeds. Between the grasses there was a trench around the hill, along which my spring branch was carried for the purpose of irrigating the timothy. The clovered part requiring new seeding, I planted the upper part of the hill in corn, and in autumn laid it down in wheat. Soon afterwards and about the time the wheat was sprouting, a hasty and hard rain fell which washed a good deal of the soil from the hill side, so as to fill the small ditch at several points and then carried a

good deal of earth upon the firm sod of the meadow below, which had recently been mowed. Going into it immediately afterwards for the purpose of having the obstructions in the water trench removed and other damages repaired, I observed that with the earth left on the meadow were many grains of wheat. I had no apprehension of evil consequences at the time, and supposed that those seeds would either perish from want of covering, or the watering of the meadow during winter, or would be wheat and removed at the next year's mowing. They however, vegetated and grew vigorously, and the next spring every bunch proved to be *cheat*, while not one single head of cheat was discovered among the wheat which remained and grew on the hill where it was sowed and ploughed in—which yielded a good crop, exceeding 20 bushels to the acre, and would have been larger, if it had not received injury, for a short time, from the clover caterpillar. In addition, I have to state that in no part of the meadow was there cheat, except where the earth and seed wheat washed from the hill, were deposited.

To me this phenomenon seems inexplicable, on your hypothesis—but I do not mean to reason on it—leaving that to you and “taking on myself the responsibility” for the fact only. Yet, while I dare not affirm that you are in error, I must say that it seems to me imprudent to deny positively the metamorphosis alleged by so many persons upon observations apparently careful and accurate. It is true that generally, “it hath pleased God to give to every seed his own body,” and we expect, in the order of nature, when we sow, to reap “after its kind.” Nevertheless, we know but little of substances, and we know also that nature is constantly working wonders and producing monsters both in the animal and vegetable portions of her productions. Facts alone can decide a controversy, and they alone ought therefore to be looked after—and looked to. * * * *

Sumpter District, S. C. 14th May, 1834.

The subject of marl is a very important one, for the declining states of the Atlantic section. Is it not probable that it is to be found at the same distance from the sea coast, and the primitive formation in the Carolinas? I should suppose so.

It is a great pity a good geological, topographical, mineralogical and geographical survey, could not be had of the States. Why could not there be a class at West Point especially organized for this purpose, whence would issue surveyors of the proper kind? With these the States could join their intelligent youth, who formed into companies, could traverse the country with their instruments, and confer all the benefit which could be required.

The seasons here have been up to this period, very disastrous to the crops of cotton and corn, both of which look miserable from the excessive cold. Corn is selling in Columbia and Camden and the country below, at 87½ to 100 cents per bushel, and will be in some districts worth 125 to 150 cents, before the harvest. In Charleston, the North Carolina corn is to be had at not less than 72. It would be curious to know, what part of these 72 cents go to the grower; and whether a rail road from Roanoke to Fayetteville, and thence to the Pee Dee, would not put a larger portion into his pocket, and open a much more extensive

market. By growing a large quantity of oats, many planters might buy corn, if sold at a cheap rate, and thus for a few years rest, could restore their land.

Isle of Wight, Va. 23d May, 1834.

* * * I now congratulate you on the success and high character, of that publication. And I trust, it will greatly contribute to accelerate the hitherto slow, and almost imperceptible progress of agricultural improvement in Virginia. I am not one of those, however, who imagine that the exhausted fertility of the lands of our state, can be restored in any short period of time. The impoverishment and devastation, which it required more than two centuries to produce, can only be repaired by the successive efforts of several succeeding generations. Nor do I think that improvement in agriculture, necessarily or even essentially depends on any particular system or manner of husbandry. There is only one thing, and that is manuring in some way or other, essential to keep up fertility in land that is cultivated, or to import it in a short time to that which has been exhausted. My own opinion is, that expectations far too sanguine, are indulged by young farmers, as to the facility of improving land; and these are unreasonably encouraged by most of our writers on the subject. And the disappointment of these unreasonable expectations, has perhaps as great a tendency to drive respectable emigrants to the west, as any other cause.

THE FENCE LAW.

May 24th, 1834.

I have seen several communications in the *Farmers' Register* on the subject of enclosing. Since, I have spoken to a dozen or more of my acquaintances on the propriety of our legislature, passing a law prohibiting cattle, hogs and sheep, from running at large, and thereby enabling us to do without fences—and every one of whom highly approved of the plan. I have no doubt but that the farming interest would derive more benefit from the passing such a law, than from any other legislative aid it could receive.

I entirely concur with the views of your correspondent on that subject in No. 12 of the *Farmers' Register*, under the signature of "Anti-fence." Before seeing that communication, I had been thinking myself of getting up a petition and circulating it in this county, praying the passage of such a law as that Anti-fence speaks of. It is my opinion it would receive the signatures of a decided majority of the voters of the county. But as was suggested by Anti-fence, for the sake of uniformity, I think it would be better that a petition come through the *Farmers' Register*.

ERRONEOUS VIEWS RESPECTING GYPSUM.

For the Farmers' Register.

The last *Genesee Farmer*, (of May 10th,) contains a communication professing to answer some earlier inquiries respecting gypsum, which may be considered as a curiosity, on account of the number and magnitude of the errors which the writer has contrived to pack into so narrow a space. I will quote the whole piece, and in its regular order, but with my own remarks attached, or in-

terlined, so as to require but few words to serve my purpose.

"MR. L. TUCKER—I think your correspondent "T. S. P. may be assured that gypsum ground "fine, and laid for a long time exposed to the atmosphere, will lose much of its fertilizing quality. "Gypsum and limestone, when reduced to powder, "have a strong affinity for carbonic acid." [Neither of them has the slightest affinity for carbonic acid—for limestone is already furnished with as much as its proportion of earth (lime) can combine with—and gypsum is equally saturated with a stronger acid (the sulphuric) which effectually prevents any affinity for, or any effect being produced by carbonic acid.]—"and in as far as they are saturated with this principle, they lose their attraction "for it." [This taken alone is true, and would have served to have overturned the preceding part of the same sentence, if the writer had known that one of the substances, limestone, is already and always saturated with this principle, and that the other, gypsum, cannot possibly take up the least particle of it.] "If either be reduced to powder, and spread thin on a plate, and the plate be "set in [over] a fermenting tub of beer, they will "soon be converted to carbonate of lime, or chalk." [That is, would be converted to what the limestone is already, and what neither this, nor any exposure, can possibly make of gypsum. If *quick lime*, instead of limestone and gypsum, was the substance so treated, then such a conversion to carbonate of lime would take place.] "The same "will occur partially if left exposed to atmospheric "air, and in as far as they imbibe this principle, "they lose their fertilizing qualities. Such are my "ideas on this subject, and remain yours, R. M. "W." As such effects cannot take place at all, for the reasons before stated, under any circumstances, it is not worth showing that this inference is as much mistaken, as the theory upon which it rests: nor is there any need of more words to show, that if gypsum loses its power by standing exposed to the air, (which cannot be inferred from its chemical composition or qualities,) we must search for other, and very different causes, than those presented by R. M. W. It is not however my intention to discuss that question, but simply to expose the errors which by being presented so confidently, and in so respectable a journal as the *Genesee Farmer*, might possibly be imposed on some readers for truth, and knowledge. J. B.

ON THE NECESSITY AND MEANS FOR LEGISLATIVE AID TO AGRICULTURE—NO. 2.

[Continued from page 690, Vol. 1.]

For the Farmers' Register.

According to the intention expressed in a former communication, I proceed to consider the means by which government may promote the improvement of agriculture; and shall direct my observations more particularly to those institutions and plans, which have been least discussed by my fellow laborers in this cause. I shall now consider

Experimental and Pattern Farms.

Among the establishments for the improvement of agricultural science and skill, which have been recommended at different times, a "model or pattern farm" has held a conspicuous place. If I have rightly understood what this establishment was to be, from the words of its advocates, the

model farm was to exhibit, for the example of the agricultural community, the best cultivation and management, the most perfect processes of farming, the use of the most improved utensils and machines, and the trial of experiments on a plan calculated to obtain full and satisfactory results. Now all these subjects are important, and their being attained is highly desirable: but by combining so many on one farm, and under one directing mind, I have no doubt of a failure in almost every part of the scheme. The view to profitable crops and products, (the main object of course on a farm) would prevent any thing like proper and continued attention to courses of experiments: and still there would be enough experiments, and trials of new utensils and machines, and of new plans of tillage, to prevent economy and good management, and the permanency of any regular system, and to cause every year to be marked by disappointment and loss. It does not require much foresight to be satisfied, that a farm on this plan would exhibit any thing but a pattern for others to copy, in all respects; and the contrast between its object and its results—its promise and its performance—would render it a subject for general and unsparing ridicule, and a means of injuring the cause it was intended to sustain.

But putting aside these obstacles to the deriving any farming profit from such an establishment, it may be well doubted whether profit could be made from the crops of any farm, under any possible management, when owned by, and cultivated for the benefit of an agricultural society, or the commonwealth. We know how wasteful is the management, and how unproductive the labors of the agents of the public, and of all joint stock associations: and if a farm of the richest soil, and completely stocked, was managed in like manner, it would most likely yield loss, rather than profit, on the investment of capital. For all these reasons, it would be safest not to calculate on any pecuniary profit being derived from such establishments; but to look for the benefits to be derived, from other sources, and through other means; and these will be found to promise so rich a harvest, that the commonwealth may well afford to pay the cost of making such experiments.

Though an experiment sometimes leads at once to highly profitable results, such cases are very rare; and whatever may be the value of the truths thus established, to the public, the individual who institutes experiments in agriculture, is almost sure to lose by ninety-nine of them in the hundred—and to have his losses increased (on the average) in proportion to the care, accuracy, and patience with which he conducts his experiments. In other words, his losses increase in proportion to the increase of benefit which the public derive (or might derive if they were made known,) from his labors. It is not therefore surprising that there are but few experiments made by individual farmers—and scarcely any conducted in the careful, patient, and expensive manner which is required, to obtain undoubted and valuable results. But this is not the worst. Though not one truth is ascertained by experiment, where one hundred ought to be, and might be, even the few which are discovered remain unknown to the public, and are often forgotten completely, for want of sufficient means of communication: and thus, the labors of the experimenting farmer are almost as sure to be useless

to his country, as they are to be hurtful to his own private interest.

In conformity with the views formerly expressed on the subject of the legislative aid needed for the improvement of agriculture in Virginia, I shall not notice those means which others have treated of in the Farmers' Register; and I may pass over the discussion of the importance of experiments, and the course respecting them which agricultural societies ought to pursue, because these parts of the subject have been considered at large, in several pieces in the early numbers of this journal. Taking it for granted, or as proved, that numerous well planned and well conducted experiments on the disputed and doubtful points in agriculture, would be highly beneficial, (if not more beneficial than all other aids,) to the improvement of agricultural science and practice, I proceed to maintain, that to secure this end, the state should establish one or more experimental and pattern farms—not to reap farming profits—but to obtain and disseminate agricultural truths.

If there were a dozen such establishments, there would be no lack of proper subjects for experiments. Indeed it may be truly said that there are more doctrines and facts in doubt, than have yet been clearly settled. But I am not advocating so large a commencement. One such farm would be enough to render great general benefit, and would consume but a small portion of the funds which the legislature ought to appropriate, and I hope will appropriate, for the general improvement of agriculture.

But though I consider profitable farming as out of the question on such an establishment as I propose, it does not follow that it may not show what good farming is, and serve as the best of models for profitable farms. If it was intended to test the value of the product to be derived from a clover fallow, such as has been described by Mr. Carter and Mr. Selden in the Farmers' Register, and for that purpose all the operations were conducted in the most perfect manner, and the crops of wheat were to be thereby doubled—it would not lessen the value of the result, that no regard had been paid to economy in the general management. If there was exhibited an important result from the preparation of a certain field in a particular mode, or with particular kinds of ploughs and harrows, we could imitate the process, and obtain the like results, without imitating the bad and wasteful management which might have been evident in that, as in every other operation. When engineers, chemists, and scientific mechanics, have made a series of experiments to establish some particular truths, who was ever so silly as to expect profit from such experiments, or to undervalue the results on account of their cost? Governments have often ordered such experiments, and their wisdom in so doing has always been deservedly applauded. Let our government only do the same for agriculture, which has a ten fold greater claim than all other arts, and has a ten fold greater need of such assistance.

It would be worth the employing of the best chemical talent that our country can produce, and the expenditure of \$10,000, if so much was required, to carry through a proper series of experiments on the preparation, preservation, and use of barn-yard and stable manure. All sorts of contradictory opinions are held and acted upon on this

subject, although volumes on volumes have been written, and a century consumed in the discussion, without having decided any thing. Perhaps none of these opinions and practices are right—and certainly the greater part must be wrong—and the manure destroyed and wasted by our ignorance in Virginia every year, would support an experimental farm in every county in the state, and every other public institution that has been ever thought of for agricultural improvement. There never will be much light thrown on the mysterious subject of the fermentation of manures, until it is made a matter of the most attentive investigation by scientific and practical chemists—and even if any one individual farmer could be found who was qualified for the investigation, there is none who could submit to the long continued attention and labor, and the very heavy expenses, which would be required for the purpose.

These illustrations are merely brought forward as examples of what an experimental farm could do, and not as the objects which it would be most advisable to begin upon. Every one who will think on the subject will discover, in abundance, proper and profitable work (profitable for the general interests I mean,) to employ all the labor and money that may be appropriated for such purpose. If I induce any to *think*, it is enough: it is not my object, and is altogether needless, to state what will occur to every mind that is directed to the subject.

R. N.

MONTHLY COMMERCIAL REPORT.

To the Editor of the Farmers' Register.

Sir—Since my last communication there has been scarcely any change in the situation of commercial affairs. A state of torpor prevails in all the large cities north of Virginia. The spirit of enterprise, which had given activity to commerce and manufactures, continues paralyzed; the industry which was engaged in other than agricultural pursuits, finds no occupation, and not one of the many avocations which employed the capital and labor of our northern brethren, retains its former activity. Bankruptcies have ceased, because few new engagements were made after credit received its shock. This state of inactivity does not prevail so sensibly in the Southern States, whose commerce, instead of being ramified like that of our large cities, throughout every part of the world, is chiefly confined to supplying raw materials to the manufacturers of other countries. Those countries will resort to us, as we do to China, and carry on the trade of which we debar ourselves—a much larger portion of our commerce is therefore conducted on foreign account and with foreign capital than has been in former years.

The prices of our produce have not varied materially during the month. Very fine tobacco, of which the crop contains a smaller proportion than usual, sells at \$7 to 11—good 5½ to 6½—inferior and middling 3 to 5. The quantity inspected is less than any former year.

As usual at this season, there is no wheat in market, and most of the mills are idle. Offers are made of early deliveries of the growing crop at one dollar per bushel, or a fraction higher. Flour is worth about \$4 50, except that made at the City Mills, of high repute, and which is exported almost entirely to South America. Our farmers

may be enabled, in consequence of the immense establishments which will be in full operation this summer, to obtain a higher price for their wheat than can be afforded by the northern millers, who have heretofore procured a portion of their supplies from Virginia.

The price of cotton (12 to 13 cents) has scarcely varied during the month, and has been higher in our markets than in those south of us, where all commercial operations are now greatly embarrassed by the difficulty of making negotiations. Bills on New York, which command a premium in Virginia, are at a discount in the southern cities, and the requisite amount cannot be negotiated unless at a sacrifice to brokers.

x.

P. S. Can you not induce some of your intelligent agricultural friends in different parts of the country, to give you a monthly report of the growing crops? From the 12th to the 16th of this month there were severe frosts—most unusual in our climate. It would be interesting to learn what injury was done. The Hessian Fly is said to have committed extensive ravages on the wheat crop—this is another subject of interest.

x.

May 28th, 1834.

[Reports of seasons and crops have been already asked for, with very little success. The facts alluded to by X. are enough to show the want of such information. The effects of the frosts of the nights before and after the 16th, were not only unusually severe, but operated very unequally. No considerable damage however, it is believed, was sustained by any field crops—though the first alarm caused some cotton to be ploughed up, and planted again. The Hessian Fly will cause much greater damage than has ever been previously suffered by our own wheat, though it was sowed within the time which usually insures safety. Other neighboring fields suffer as much, and will not yield the half of average crops: but it is said that others within ten miles, are but little affected. Thus it is, that a single reporter, confined to his own farm, or even his own neighborhood, might serve to spread error, more than correct information on such subjects, though many reporters would fully serve the purpose desired, and be of great service to the whole agricultural community.]

CHEAP EDITION OF THE FARMERS' REGISTER.

The only objection which has been made to the Farmers' Register is its price—and this is the principal obstacle to its circulation being extended very far beyond its present limits. It would not be difficult to show that the dearth of this work is alleged without good ground, and by a very unfair mode of comparison with low priced newspapers, in which mere bulk is considered, without regard to the nature of the contents, or the execution of the work. The appearance of a paper that is usually thrown aside as soon as it has been looked over, is not judged severely by its subscribers; and if it is so printed as to be both legible and intelligible, most readers are content. But a periodical

publication in the style in which the Farmers' Register appears, requires far more care and expense; and it is presumed that not many of its subscribers would be willing that it should lose its rank in this respect, even though accompanied by a reduction of price.

There is another reason, and a very important one, why most papers, and even most agricultural papers, may be furnished at lower prices, in proportion to the amount of matter printed, than the Farmers' Register. The latter derives no profit from advertisements entering the body of the work—and these furnish a considerable part, and generally much the greatest part of the profit of the paper that admits them. It is for our readers to compare this publication with others as to the quality and value of the matter furnished. Considering merely size and beauty, and correctness of execution, taken together, this is the cheapest periodical that has yet appeared in the southern states.

But though justice requires that we should thus meet the objection to the alleged high price of the Farmers' Register, we know that the most conclusive arguments on this head will not avail much in extending its circulation. To effect this object, it is necessary to furnish a publication which shall be *cheap in every sense*—and therefore it is intended to offer one which may be compared with most others, as to price, by measure and bulk, without losing any thing in correctness, or in any other respect than external appearance. This experiment will be made forthwith—and it will be for the farming community to decide whether it shall be supported or not.

In addition to the present monthly publication, the Farmers' Register will be issued in a single sheet of 16 pages, four times a month. By using paper of inferior quality, and saving the expense now incurred for pressing, folding, and stitching and covering the sheets, and of the guarantee of the safe passage of the copies by mail, the price may be reduced to the following rates—at which the *Cheap Edition* will be furnished, commencing with this sheet.

For one copy, or 48 sheets in 12 months, \$3 00

For 4 copies, subscribed and paid for in advance at one time, \$10, or for each, - 2 50

To any person who is already a subscriber to the monthly Farmers' Register, the price of a single copy of the cheap edition will be, - 2 50

And 5 subscribers to the monthly Farmers' Register, may, by subscribing at once, for the cheap edition, receive their copies for \$10, or for each, per annum, - 2 00

The price of the cheap edition, in every case, must be paid in advance.

The cheap edition will be commenced regularly as soon as the names of 500 subscribers are returned. As but few copies will be struck off more than for actual subscribers, the year of subscription will generally be commenced with the last published number: but if desired by the subscriber, he will be supplied with back numbers, as long as they can be furnished. The matter contained in every sheet will be precisely the same with that of the monthly Farmers' Register.

It is presumed that the low price at which it is offered to existing subscribers, will induce many to take the cheap edition, if for no other reason than the better preservation of the higher priced copy. To all such, who take the cheap edition, and who may choose to let their higher priced monthly numbers remain with the publisher until the close of the volume, they shall be delivered in neat and strong half binding, (with leather backs and corners,) for an additional sum of 50 cents for each volume—or without any charge for binding, if the cheap edition was obtained at not less than \$2 50. These several advantages offered to the subscribers to the monthly publication, it is presumed will be to them a sufficient pecuniary compensation for the facility which their subscriptions afford to the issuing the cheap edition.

It is frankly admitted that it is the liberal aid already afforded by existing subscriptions to the Farmers' Register that enables the proprietor to offer this edition in so cheap a form—and that the future diminution of that aid, should it occur, will put an end to this plan, as soon as all existing engagements have been complied with: unless, indeed, the list of subscribers to the cheap edition should by that time become so extended, as to furnish of itself a source of profit. In that event, the monthly edition may also be reduced in price, though it will necessarily be always higher, for those who desire such paper and press work as will make a handsome volume.

Further—for the purpose of facilitating payments through the mail to those who wish to subscribe for more than one publication, and also as more suitable to the now general state of pecuniary embarrassment, the price of the *Farmer's Library* will be reduced to \$2 50, by its first proposed size being diminished in proportion. This change will be stated more particularly in an amended prospectus, which will be on the cover of this number of the Farmers' Register.

The proprietor cannot lose by the publication of the cheap edition for a year, even should it be then discontinued—and by its being made, the public will gain whatever may be the value of the extended diffusion of the information contained in this work.

TO CORRESPONDENTS AND SUBSCRIBERS.

The following communications have been received, and will appear in No. 2: "On the diseases of Cattle and Sheep"—"On the cultivation of low grounds"—"On apprenticeships to farming," [continuation of *Pattern Farms*.]

Supplementary sheets containing a list of subscribers, and a general index to Vol. I. will be sent with this number—which though not separately directed, postmasters will please to deliver to the subscribers for Vol. I. who still receive the Farmers' Register at their respective post offices.

Printed by Robert Ricketts,

AT THE SHELLBANKS PRESS,

Where the printing of books, pamphlets, and other jobs, can be executed promptly, and in the best style.

THE FARMERS' REGISTER.

VOL. II.

JULY, 1834.

No. 2.

EDMUND RUFFIN, EDITOR AND PROPRIETOR.

ON THE CORN CROP.

From the proceedings of the New York State Agricultural Society. By J. BUSL.

There is no crop more beneficial to the American farmer than Indian corn. An eminent agriculturist, the late John Taylor of Virginia, called it the "meal, meadow, and manure," of the farm. It is convertible into human food in more forms than any other grain; its value in fattening domestic animals is not exceeded by any product of the farm; and no crop returns more to the soil than this does in the form of manure. There are two important requisites, however, to its profitable cultivation. The first is, that the soil be adapted to its growth; and the second, that the crop be well fed and well tended: for food and attention are as important to the plant as to the animal. Ordinarily speaking, it costs less to take care of a good crop of corn, on proper corn land, than it does of a bad crop on land not adapted to its culture. The first is light and dry. The latter stiff, wet or grassy. I put the average expense of cultivating and securing an acre, at \$16, (a) including a fair rent though it ordinarily exceeds this sum. The farmer, therefore, who obtains thirty bushels from the acre, estimating the grain at 50 cents per bushel, gets a fair compensation for his labor, and the use of his land. Whatever the product falls short of this is an absolute loss; and whatever it may exceed it is net gain. Thus the man who gets but twenty bushels from the acre, loses upon this estimate \$20 worth of his labor, on four acres. He who raises 80 bushels an acre, on the other hand, realizes a net profit of \$100 from four acres—making a difference in the profits of the two farmers, in the management of four acres of corn, of one hundred and twenty dollars! These data are sufficiently accurate to show the importance of the two requisites I have suggested, and the value of a little calculation in the business of farming. The habit of noting down the expense, as well as the product of a crop, and thus ascertaining the relative profit and loss, is highly advantageous to the practical farmer, and one which cannot be too strenuously inculcated. It will perhaps be said, that I ought to add the value of the manure which is employed in the large crop; but I reply that I offset this against the increased forage which this crop furnishes. Besides, by applying the manure in the unfermented state in which it is generally found in the spring, it will be as beneficial to the succeeding crops, as though it had lain and fermented in the yard, and been applied in the usual way in the autumn. (b)

The soils adapted to the culture of Indian corn, are such as are permeable to heat, air (c) and the roots of the plant, and embrace those denominated sandy, gravelly and loamy. Corn will not succeed well on grounds that are stiff, hard or wet. The roots grow to as great a length as the stalks, and the soil must be loose to permit their free extension.

The manures used are generally yard and stable dung, and plaster of paris, (sulphate of lime.) The first ought to be abundant; as upon the fer-

tility which it induces depends the profit of the crop. Long or unfermented manure is to be preferred. It decomposes as the wants of the plant require it; while its mechanical operation, in rendering the soil light and porous, is beneficial to the crop. It should be equally spread over the whole surface, before it is ploughed under. It then continues to afford fresh pasture to the roots till the corn has matured, and is in its place to benefit the succeeding crop. If put into the hill, the roots soon extend beyond its influence, it does not so readily decompose, and the subsequent crop is prejudiced from its partial distribution in the soil. In a rotation of four or five years, in which this crop receives the manure, twenty-five or thirty ordinary loads may be applied to one acre with greater profit, than to two or three acres. Every addition tells in the product; and there is scarcely any danger of manuring too high for this favorite crop. Gypsum is applied broadcast before the last ploughing or harrowing, or strewed on the hills after hoeing. I pursued the first method, at the rate of a bushel to the acre. (d)

The best preparation for a corn crop is a clover or other grass lay, or lea, well covered with a long manure, recently spread, neatly ploughed, and harrowed lengthwise of the furrow. A roller may precede the harrow with advantage. The time of performing these operations depends upon the texture of the soil, and the quality of the sod. If the first is inclining to clay, or the latter tough, or of long continuance, the ploughing may be performed the preceding autumn; but where sand or gravel greatly preponderate, or the sod is light and tender, it is best performed in the spring, and as near to the planting as convenient. The harrow at least should immediately precede planting. All seeds do best when put into the fresh stirred mould. Stiff lands are ameliorated and broken down by fall ploughing; but light lands are rather prejudiced by it. When corn is preceded by a tilled crop, the ground should be furrowed, and the seed deposited in the bottoms of the furrows. Where there is a sod, the rows should be superficially marked, and the seed planted upon the surface. Where the field is flat, or the sub-soil retentive of moisture, the land should be laid in ridges, that the excess of water which falls may pass off in the furrows.

The time of planting must vary in different districts and in different seasons. The ground should be sufficiently warmed by vernal heat to cause a speedy germination. Natural vegetation affords the best guide. My rule has been to plant when the apple is bursting its blossom buds, which has generally been between the 12th and 20th of May.

Preparation of the seed. The enemies to be combated are the wire worm, brown grub, birds and squirrels. Of these, the first and two last prey upon the kernels, and against these tar offers a complete protection. I soak my seed 12 to 20 hours in hot water, in which is dissolved a few ounces of crude saltpetre, and then add (say to eight quarts of seed) half a pint of tar, previously warmed and diluted with a quart of warm water. The mass is well stirred, the corn taken out, and

as much plaster added as will adhere to the grain. This impregnates and partially coats the seed with the tar. The experience of years will warrant me in confidently recommending this as a protection for the seed.

The manner of planting is ordinarily in hills, from two and a half to six feet apart, according to the variety of corn, the strength of the soil, and the fancy of the cultivator. The usual distance in my neighborhood is three feet. Some, however, plant in drills of one, two and three rows, by which a greater crop is unquestionably obtained, though the expense of culture is somewhat increased. (e) *The quantity of seed* should be double, and may be quadruple (f) what is required to stand. It is well known that a great difference is manifest in the appearance of the plants. Some appear feeble and sickly, which the best nursing will not render productive. The expense of seed, and the labor of pulling up all but three or four of the strongest plants in a hill, it is believed will be amply remunerated by the increased product. If the seed is covered, as it should be, with fine mould only, and not too deep, we may at least calculate upon every hill or drill having its requisite number of plants.

The after culture consists in keeping the soil loose and free from weeds, which is ordinarily accomplished by two dressings, and in thinning the plants, which latter may be done the first hoeing, or partially omitted till the last. The practice of ploughing among corn, and of making large hills, is justly getting into disrepute: for the plough bruises and cuts the roots of the plants, turns up the sod and manure to waste, and renders the crop more liable to suffer by drought. The first dressing should be performed as soon as the size of the plants will permit, and the best implement to precede the hoe is a corn harrow, adapted to the width of the rows, which every farmer can make. This will destroy most of the weeds and pulverize the soil. The second hoeing should be performed before or as soon as the tassels appear, and may be preceded by the corn harrow, a shallow furrow of the plough, or what is better than either, by the cultivator. (g) A slight earthing is beneficial, providing the earth is scraped from the surface, and the sod and manure not exposed. It will be found beneficial to run the harrow or cultivator a third, or even a fourth time, between the rows, to destroy weeds and loosen the surface, particularly if the season is dry. (h)

In harvesting the crop, one of three modes is adopted, viz. 1. The corn is cut at the surface of the ground, when the grain has become glazed, or hard upon the outside, put immediately into stooks, and when sufficiently dried, the corn and stalks are separated, and both secured. 2. The tops are taken off when the corn has become glazed, and the grain permitted to remain till October or November upon the butts. Or, 3. Both corn and stalks are left standing till the grain has fully ripened, and the latter becomes dry, when both are secured. There are other modes, such as leaving the butts or entire stalks, in the field, after the grain is gathered; but these are so wasteful and slovenly as not to merit consideration. The stalks, blades, and tops of corn, if well secured, are an excellent fodder for neat cattle. If cut, or cut and steamed, so that they can be readily masticated, they are superior to hay. Besides, their

fertilizing properties, as a manure, are greatly augmented by being fed out in the cattle yard, and imbibing the urine and liquids which always there abound, and which are lost to the farm, in ordinary yards, without an abundance of dry litter to take them up. By the first of these methods, the crop may be secured before the autumnal rains; the value of the fodder is increased, and the ground is cleared in time for a winter crop of wheat or rye. The second mode impairs the value of the forage, requires more labor, and does not increase the quantity, or improve the quality, of the grain. The third mode requires the same labor as the first, may improve the quality of the grain, but must inevitably deteriorate the quality of the fodder. The corn cannot be husked too promptly after it is gathered from the field. If permitted to heat, the value of the grain is seriously impaired. (i)

Saving seed. The fairest and soundest ears are either selected in the field, or, at the time of husking, a few of the husks being left on, braided and preserved in an airy situation till wanted for use.

In making a choice of sorts, the object should be to obtain the varieties which ripen early, and afford the greatest crop. I think these two properties are best combined in a twelve rowed kind which I obtained from Vermont some years ago, and which I call Dutton corn, from the name of the gentleman from whom I received it. It is earlier than the common eight rowed yellow, or any other field variety I have seen, and at the same time gives the greatest product. I have invariably cut the crop in the first fourteen days in September, and once in the last week in August. The cob is large, but the grain is so compact upon it, that two bushels of sound ears have yielded five pecks of shelled grain, weighing 62 lbs. the bushel.

In securing the fodder, precaution must be used. The butts become wet by standing on the ground, and if placed in large stacks, or in the barn, the moisture which they contain often induces fermentation and mouldiness. To avoid this I put them first in stacks so small, that the whole of the butts are exposed upon the outer surface; and when thoroughly dry they may be taken to the barn, or left to be moved as they are wanted to be fed out, merely regarding the propriety of removing a whole stock at the same time.

NOTES.

(a) *Estimated expense of cultivating an acre of Indian corn:*

One ploughing, (suppose a clover lay,) -	\$2 00
Harrowing and planting, - - - - -	2 00
Two hoeings, 4 days and horse team, - -	3 75
Harvesting, 2 days, - - - - -	1 50
Cutting and harvesting stalks, - - - - -	1 50
Rent, - - - - -	5 00
	\$15 75

(b) Stable and yard manures lose 50 per cent. by the fermentation they undergo in the yard during the summer. This loss consists of the gases which are evolved in the process of rotting, and of the fluids which sink into the earth, or are carried off by the rains. Plants receive their food either in a gaseous or liquid form. If manure rots in the soil, neither these gases or fluids are lost: the earth retains, and the roots of the plants imbibe them. Yet recent manures are not proper to

be applied to small grains. They cause too rank a growth of straw, and are apt to induce rust and mildew. Thus a crop of corn, potatoes, or ruta бага may be *fed* and *futtened*, if I may use the expression, upon the dung which is destined to nourish the wheat crop, without deteriorating its value for the latter purpose, if it is applied to the corn, &c. before it has fermented.

(c) We are on the northern border of the maize zone, and should make up for defect in climate by selecting soils into which the heat readily penetrates. Air, besides conveying warmth in summer, imparts fertility by the vegetable food which is always suspended in it in the form of gases. Dews are also charged with these properties of vegetable nutriment, and when the soil is porous, they settle down as in a sponge, and impart fertility to the roots (the true mouths) of plants.

(d) I adopt the opinion of Davy, as the *modus operandi* of plaster of paris, that it forms a necessary constituent of plants which it benefits, and is of no direct benefit to plants which do not afford it on analysis. Among the first are the clovers, corn, potatoes, and generally such plants as have broad or succulent leaves; while the latter embrace culmiferous grains and grasses, as wheat, rye, timothy, &c. Critical observation for years has confirmed me in this conclusion. Gypsum, must be rendered soluble before it can be taken up by the mouths of plants, and it requires 600 parts of water to dissolve one of this mineral. I infer from these facts, that by burying it in the soil, it more readily dissolves, and is more accessible to the mouths of plants, than if spread upon the surface of the ground. I am induced, from these views of the subject, to sow plaster, on grass grounds, in March, and upon corn and potato grounds before the last ploughing for these crops. The latter was recommended and practised by the distinguished agriculturists, the late Mr. Taylor of Virginia, and Judge Peters, of Pennsylvania.

(e) The following table exhibits the difference in product of various methods of planting, and serves also to explain the manner in which large crops of this grain have been obtained. I have assumed in the estimate, that each stalk produces one ear of corn, and that the ears average one gill of shelled grain. This is estimating the product low; for while I am penning this (October) I find that my largest ears give two gills, and 100 fair ears half a bushel of shelled corn. The calculation is also predicated upon the supposition, that there is no deficiency in the number of stalks, a contingency pretty sure on my method of planting.

	Hills.	bush.	qts.
1. An acre in hills, 4 feet apart, each way, will produce -	2722	42	16
2. The same, 3 by 3 feet, -	4840	75	20
3. The same, 3 by 2½ feet, -	5808	93	28
4. The same in drills, at 3 feet, plants 6 inches apart, in the drills, -	29,040	113	14
5. The same in do. 2 rows in a drill, 6 in. apart, and the plants 9 in. and 3 feet 9 in. from centre of drills thus, -	30,970	120	31

6. The same in do. 3 rows in a drill, as above, 3 ft. from centres of drills, 43,560 170 5

The fifth mode I have tried. The ground was highly manured, the crop twice cleaned, and the entire acre gathered and weighed accurately, the same day. The product in ears was 103 baskets, each 84 lbs. net, and 65 lbs. over. The last basket was shelled and measured, which showed a product on the acre of 118 bushels 10 quarts. I gathered at the rate of more than 100 bushels the acre, from four rods planted in the third method last summer; the result ascertained in the most accurate manner. Corn shrinks about 20 per cent after it is cribbed. The sixth mode is the one by which the Messrs. Pratts, of Madison county, obtained the prodigious crop of 170 bushels per acre. These gentlemen, I am told, are of opinion, that the product of an acre may be increased to 200 bushels.

(f) I am told the Messrs. Pratts, above alluded to, used seven bushels of seed to the acre, the plants being subsequently reduced to the requisite number.

(g) The cultivator is made in the form of a triangular harrow, with two bulls; or if intended to be graduated to different widths, a centre bull is added, to which the exterior ones are attached by hinges. Iron slats, fixed to the exterior bulls, pass through a mortice in the centre one, perforated with holes, through which an iron pin passes to hold them at the graduated width. The teeth may be in any approved form, or reasonable number. The cultivator I used has five teeth, two in each of the outward, and one upon the centre timber. The teeth have a stout shank, with a duck's foot termination, four inches broad, somewhat cylindrical, rounded at the point, and inclined forward in an angle of 30 or 40 deg. This implement is useful for other purposes; and may be used, like Beaton's, as a substitute for the plough, in preparing light soils for a crop. The handles are attached to the centre piece. The teeth have a shoulder, on the under side of the timber, and are fastened with screws and nuts above.

(h) Some entertain a mistaken notion, that it is prejudicial to stir the soil among corn in dry weather, and others that weeds serve to prevent the evaporation of moisture by a hot sun. The reverse of these opinions is true. The exhaustion of moisture by a plant is in the ratio of the surface of its leaves and stalks presented to the sun and air.

(i) The leaves are the necessary organs for elaborating the food of plants, and when these are taken away the plant must cease to grow. The sap is useless until it undergoes elaboration in the leaves. Hence, when corn is topped in the usual way, the supply of food is cut off from the grain, except what may be elaborated in the husks. On comparing corn gathered by the first and second modes, it was the opinion of those who assisted in husking, that the first was soundest, brightest and heaviest. The third mode I have not tried. But it seems probable, that the grain might acquire an increase of volume, though it would lose again by depredation and waste. The first method has these further advantages that it preserves the cob from being saturated with rains, and secures the fodder, when it is in its highest perfection and greatest quantity.

THE GARDEN.

From the (New York) Cultivator.

Though we do not intend to enter into the minute details of gardening, nor to say much of the ornamental portion of the art, yet we would fain encourage a taste for this branch of labor, which does much to multiply our comforts, and refine our manners, and proffer such occasional directions as may tend to benefit the generality of our readers. We go upon the principle that we all ought to look for our chief happiness *at home*; and that the more this home is embellished, and provided with the varied productions of the soil, the stronger will our attachments be to it, and the more multiplied will be our enjoyments. At all events, there are many productions of the garden which are in a measure indispensable in every family; and the farmer can raise them with more economy than he can buy them. It is in relation to the culture of these that we intend to offer some brief remarks.

Among the general rules which ought to be regarded in the management of a garden, and which in some measure apply to the management of a farm, we may particularize the following:—

1. A garden should be enclosed by a secure fence—otherwise an unruly animal may destroy in a night the fruits of many a day's toil.

2. A garden should be rich: for here the maxim particularly applies,—that it is better to cultivate a small piece of ground well, than a large one slovenly and bad. "*Well done*" is the only "*good enough*," for a garden.

3. Do not plant your roots and vines in the shade, or under the drippings of trees, but in an open exposure. Appropriate these situations to medicinal plants and herbs. Trees impoverish the ground, and their shade is baleful to most crops. Plant trees upon the north, east, and west borders, where their shade will be but partially prejudicial, or along a main alley.

4. Alternate your crops; that is, do not plant your onions or other vegetables two successive years on the same quarter. This rule is as important to the garden as it is to the farm; and every farmer, at least every good farmer, knows, that alternating his farm crops is of the first importance to profit.

5. Plant your seeds when the ground is fresh dug or ploughed, when it is filled with atmospheric air, and moist, and permeable to heat, three indispensable requisites to the vigorous germination of the seeds. They will then sprout quick, and grow luxuriantly.

6. Seeds require to be kept moist till their roots have got firm hold of the earth, and their leaves have expanded above it. To ensure this, the soil must be brought in close contact with them, and they sufficiently covered. A good precaution is to tread the fresh dug soil on the line where the seeds are to be planted, which retards evaporation from below; or, when the seeds are covered to a sufficient depth, to compress the earth upon them with a hoe, spade or board, which not only tends to retain the moisture, but to break the soil and to bring it in close contact with them. Seeds often fail to grow, or, having began to germinate, are dried and lost, for the want of moisture. And many small seeds with husky coverings, particularly flower seeds, have been declared bad, because they have been planted without due reference to this rule.

7. As soon as the plants are firmly rooted, the more the earth is stirred about them the better. This facilitates the preparation of the vegetable food in the soil, and greatly promotes growth. Next to the destruction of weeds, nothing counteracts the effects of drought so much, in garden or field, as stirring the surface of the soil.

8. Different seeds require different temperatures to induce germination; and if they are put into the ground when it is too cold, they are liable to rot. Wheat, rye, barley, &c. will germinate at 45 degrees, corn at perhaps 55, while the melon probably requires a heat of 60 to 70 degrees. The common bean will vegetate in a cold temperature, while the Lima bean will rot in a cold or wet soil. Hence, in planting, regard is to be had to the hardness of the plant which is to be sown.

The present month is an important one in the operations of the garden. If not already done, no time should be lost in sowing the seed of onions, sallads, early cabbage, peas, radishes, and in planting some early corn and potatoes. The beet, carrot, parsnip, and summer squash may also be sown. Cabbages for winter use may be sown in time, from the 20th to the 30th. As soon as the soil and the season are warm enough to bring up corn, which here is generally from the 15th to the 20th, plant your melons, pumpkins and cucumbers, though it will do equally well to plant the latter, for pickles, in the early part of June. The 15th will ordinarily do for Lima beans, which are the best of the bean family. Soak the seed of these in warm water, a few hours, and cover them slightly. My practice is to save this crop for winter use. They afford a great product. When frost is apprehended, the beans are all picked, the unripe ones shelled and dried; and, if soaked before cooking, are nearly as good as when first gathered from the vines. An acquaintance digs a large hole, in which he deposits a barrow of dung, which he covers with six inches of earth, and plants the Lima beans, and puts down poles upon the border of the manured circle. In this way they are said to grow luxuriantly, and to produce in great abundance. Of the pumpkin there are several new and much esteemed varieties, as the Valparaiso, Porter and acorn squashes. These are rather later in coming to maturity than the old yellow kind; though they have been successfully cultivated among corn. We would commend the planting out, or sowing seeds of parsley, balm, worm-wood, tanzy, garlick, hyssop, rue, sage, thyme, and other herbs, which are often required in a family.

B.

ON THE MANAGEMENT OF HORSES WHILST TRAVELLING.

From the Southern Agriculturist.

"April 24th, 1834.

Dear Sir,—As it is your request, I will now endeavor to say something about the treatment of a horse upon a journey, though, I assure you, that you have travelled much more than I have. I will, however, say, how I would treat my nags.

It is of great importance that the horse be in good condition before the journey is commenced—not very fat: he should eat nothing but the most solid food for sometime before you start, nothing light or green; for nine out of ten horses will founder if fed on green food. *Early* in the morning

give a few swallows of water; for some horses will not eat without, particularly if feverish at night. Give three quarts of corn soon after the water; he should not be limited in fodder, but let him have it before him from the time he is put up at night till you start. Give him as much water as he will drink before you start, travel very slow for the first hour, for many horses are foundered from the body becoming suddenly hot when full of cold water, just as when the reverse happens, filling the body with cold water when it is hot. Give about a gallon of water frequently, for by giving a small quantity often, the stomach is kept more cool, and there is less danger. Twice or three times during the day, put about a pint of corn-meal and a little salt into the water, and stir it well in. *Whenever* you water on the road, move off the horse *immediately*; to stand still after drinking is very wrong. When you stop for any time, say an hour or so, do not water till you are going off. I never give corn during the day—three or four quarts of oats may be given, and fodder or hay, for the quantity he will eat will not injure him. In hot dusty weather it is very gratifying to the horse to wash or wipe the face, and the inside of the nostrils with a sponge and cold water, and if you add a little vinegar, it is better;—do this at the time of and before watering. When you stop for the night, let the horse go into a lot to wallow and walk about for half an hour, then let a few bundles of fodder or hay be given to him while he is rubbed, curried, and brushed, and afterwards as plentifully as can be given. When cool have his legs washed with soap and cold water, and the feet picked out, and then let him have his fill of water, but without salt. Be careful that the horse *always* eats some fodder *before* he gets his corn: give a strong large horse eight quarts of corn at night, or as many ears as are equal to it—it is better to feed on the ear than to shell it, as the horse eats not so fast and will perhaps eat less. If the corn is new, give but half the quantity; always give oats in the morning if to be got, six quarts will not injure a horse. If the horse gets galled, wash the parts with strong whiskey and water. If your horse becomes dull and heavy on the journey, or loses his appetite, tie a lump of gum assaetida on his bit, covered or wrapped in a strong rag. This may be continued for the whole journey, and I believe prevents his taking any distemper if put with sick horses, or in stables where they have been: it also is a preventive of founder. Horses sometimes get lame on the road without any apparent cause. It is generally from being improperly shod. There are such various notions as to the treatment of a horse when foundered, that it is difficult to know what to say on the subject. I would bleed freely from the neck—give a pint of whiskey with a little warm water and molasses, with a lump of alum about the size of a nutmeg dissolved in it, and urge the horse on his journey.

I have now, my good sir, said what I would do with my horse on the road, and if any part of it is worth your consideration, you are welcome to it. Hoping that you will excuse great hurry and blunders, and with my best wishes for your having a safe and pleasant time of it,

I remain, yours, with regard,

B.

THE LOCUST.

The locust belongs to that class of insects which naturalists distinguish by the name of *gryllus*. The common grasshopper is of this genus, and in its general appearance resembles the "migratory locust," of which we have to speak. The body of this insect is long in proportion to its size, and is defended on the back by a strong corselet, either of a greenish or light brown hue. The head, which is vertical, is very large, and furnished with two antennæ of about an inch in length: the eyes are very prominent, dark, and rolling: the jaws are strong, and terminate in three incisive teeth, the sharp points of which traverse each other like scissors. The insect is furnished with four wings, of which the exterior pair, which are properly cases to the true wings, are tough, straight, and larger than those which they cover, which are pliant, reticulated, nearly transparent, and fold up in the manner of a fan. The four anterior legs are of middling size, and of great use in climbing and feeding; but the posterior pair are much larger and longer, and of such strength that the locust is enabled by their means to leap more than two hundred times the length of its own body, which is usually from two to three inches. Locusts, as the writer of this article has seen them in the East, are generally of a light brown or stone color, with dusky spots on the corselet and wingcases; the mouth and inside of the thighs tintured with blue, and the wings with green, blue, or red. These wings are of a delicate and beautiful texture; and in the fine fibres, by which the transparency is traversed, the Moslems of Western Asia fancy that they can decypher an Arabic sentence, which signifies "We are the destroying army of God."

The female locust lays about forty eggs, which in appearance are not unlike oat-grains, but smaller. She covers them with a viscid matter, by which they are sometimes attached to blades of grass, but are more usually deposited in the ground. For this purpose she prefers light sandy earths, and will not leave the eggs in compact, moist, or cultivated grounds, unless she has been brought down on them by rain, wind or fatigue, and rendered incapable of seeking a more eligible situation. Having performed this, the female dies; and the eggs remain in the ground throughout the winter. If much rain occurs, the wet spoils them, by destroying the viscid matter in which they are enveloped, and which is essential to their preservation. Heat also seems necessary to their production, for the little worm which proceeds from the egg sometimes appears so early as February and sometimes not until May, according to the state of the season. This, in the usual course, becomes a nymph, in which state it attains its full growth in about twenty-four days. After having for a few days abstained from food, it then bursts its skin, comes forth a perfect animal, and immediately begins to unfold and trim its wings with the hinder feet. The insects which first attain this state do not immediately fly off, but wait in the neighborhood for those whose development is more tardy; but when their army is formed, they take their flight from the district.

To those who have not seen a flight of locusts, it is difficult by description to convey an idea of the appearance it presents. As seen approaching in the distance it resembles a vast opaque cloud, and as it advances a clattering noise is heard, which is

occasioned by the agitation and concussion of wings in their close phalanxes. When they arrive they fill the air, like flakes of thick falling snow; and we have known the bright and clear sky of Chaldaea become darker than that of London on some heavy November day.

Wherever they alight, every vegetable substance disappears with inconceivable rapidity before them. The most beautiful and highly cultivated lands assume the appearance of a desert, and the trees stand stripped of all their leaves as in the midst of winter. After devouring the fruits, the herbage, and the leaves of trees, they attack the buds and the bark, and do not even spare the thatch of the houses. The most poisonous, caustic, or bitter plants, as well as the juicy and nutritive, are equally consumed; and thus "the land is as the Garden of Eden before them, and behind them a desolate wilderness." It seems as if nothing could appease their devouring hunger, and the energy and activity they exhibit, and the rapidity of their operations, almost exceed belief. Their depredations are not confined to the open air; they scale the walls, and penetrate to the granaries and houses. They swarm from the cellar to the garret, and, within doors and without, they are a terrible nuisance, for they are continually springing about, and often, in consequence, give a person startling raps on different parts of the face, affording very sensible evidence of the force with which they leap; and, as the mouth cannot be opened without the danger of receiving a locust, it is impossible to converse or eat with comfort. When they have settled themselves at night, the ground is covered with them to a vast extent; and, in some situations, they lie one above another several inches thick. In travelling, they are crushed beneath the feet of the horses; and the animals are so terribly annoyed by the bouncing against them in all directions of the insects they have disturbed, that they snort with alarm, and become unwilling to proceed.

It is not merely the living presence of these insects which is terrible, but new calamities are occasioned by their death, when the decomposition of their bodies fills the air with pestilential miasma, occasioning epidemic maladies, the ravages of which are compared to those of the plague. Thus famine and death follow in their train; and instances are not of rare occurrence in the East, in which villages and whole districts have been depopulated by them.

Under these circumstances it necessarily becomes an object of anxious attention, in the countries they are most accustomed to visit, either to prevent them from alighting on the cultivated grounds, or to drive them off or destroy them after they have descended.

The impression is very general that noise frightens these insect devastators, and prevents them from alighting. When, therefore, the people are aware of the approach of their armies, every kettle or other noisy instrument in the place is in requisition, with which, and by shouts and screeches, men, women, and children, unite in the endeavor to make the most horrible din in their power. The scene would be truly laughable, from the earnestness which every one exhibits in this strange employment, were not all disposition to mirth checked by the consciousness of the fearful consequences of the invasion which it is thus endeavored to avert.

How far noise may really operate in preventing their descent in ordinary circumstances, it is not easy to ascertain; but on the approach of evening, or when exhausted by their journey, nothing can prevent them from alighting. They will then descend even on the seas and rivers, of which some striking instances are recorded.

When a swarm has actually alighted, the means employed to drive them off are much the same as those to prevent their descent. But this is never attempted in wet weather, or until the sun has absorbed the dew, as the locust is quite incapable of flying while its wings are wet. When the swarm is large, or when it has come down on cultivated grounds, no measure of destruction is practicable without sacrificing the produce; but when the depredators have been driven to waste grounds, or happened in the first instance to descend upon them, various modes of extirpation are resorted to, of which the following is most effective: a large trench is dug from three to four feet wide, and about the same depth; the off side is lined with people furnished with sticks and brooms, while others form a semi-circle, which encloses the extremities of the trench, and the troop of locusts, which are then driven into the grave intended for them by the clamorous noises we have already described. The party stationed on the other side push back such insects as attempt to escape at the edges, crush them with their sticks and brooms, and throw in the earth upon them.

These insect devastators have fortunately a great number of enemies. Birds, lizards, hogs, foxes, and even frogs, devour a great number; and a high wind, a cold rain, or a tempest, destroys millions of them. In the East they are used as an article of food. In some parts they are dried and pounded, and a sort of bread is made, which is of much utility in bad harvests. They are sold as common eatables in the bazaar of Bagdad, and the cooks of the East have various ways of preparing them for use.—*Penny Magazine*.

STABLE MANAGEMENT.

From the Library of Useful Knowledge—Farmer's Series.

Notwithstanding that the cost of horses forms a prominent item in the farmer's outlay, there is frequently no part of his live-stock, nor any branch of his business, either so ill understood or so much neglected as *stable management*. Let any one look into the low-roofed, narrow, dark, and uninstalled building in which teams are often huddled together in some of the old homesteads, and the fumes arising from stagnant urine lying upon the uneven pavement, as well as from accumulated heaps of fermenting litter, and he must be convinced that it is a place as noxious to health as the cobwebbed rafters, the unwhitewashed walls, and the confusion of the harness and utensils, show it to be devoid of neatness and order. Let him examine the horses, and he will find that, although perhaps sleek from good feeding, their coats are foul and their heels greasy. Instead of exhibiting the sprightly appearance indicated by animals that have been comfortably bedded, their heavy eyes and sluggish appearance distinctly mark the state of the stable they have quitted. But though this description is strictly applicable to many stables, it must yet be admitted that those on most farms of magnitude wear a very different appearance.

A stable for farm-horses need not be rigged out

like one for hunters; but it should be roomy, clean, and well ventilated, and every thing belonging to it should be kept in its proper place. Neither is it necessary that it should be completely stalled: team-cattle are generally quiet—if vicious, they should be got rid of. A pair of horses, worked together, will stand and feed together quite as conveniently as in separate stalls, if allowed sufficient room, and two in one stall are more convenient to the carter. Horses gather their feet under them; and 5 feet, or 4½ feet if the cattle be not large, is sufficient width for the fore-quarter. A division between each pair is, however, desirable; but a strong post and rail will be sufficient, without close boarding, provided a partition be made about four feet long, and extending from thence upwards at least the full depth of the manger, so as to inclose both that and the rack. Horses, however, sometimes acquire a habit of not lying down at all in the stable, if they be not very conveniently lodged; and as this cannot but prove highly prejudicial to their health, they should, in such cases, be accommodated with roomy single stalls, or else turned out under a loose shed. Double stables, in which horses stand heel to heel, are objectionable; and hay is better when cut fresh daily from the stack, as well as more economically used, than when kept in lofts. Corner racks are preferable to those which extend along the front; and if bars be nailed across the manger, at about a foot distance from each other, they will prevent the horses from throwing out their food, which they are apt to do in search of the corn, when it is mixed with chaff, as well as when they have filled themselves. Every kind of food should also be administered in small quantities at a time: when manger-meat is given, and even when racked up for the night, the provender should be served out sparingly. A cart-horse, fed on dry food, will require from two to three hours to consume his morning feed; the men should therefore be early in the stable, and all food should be punctually given at stated hours. Regularity should also be observed in the hours of their work. A farm-horse can well support ten hours' labor in the day, provided he be not hurried, and the time be divided into two equal periods, with a rest of at least two or three hours between. In the short days of winter, when that cannot be allowed, the time may be prolonged to six or even seven hours, but ought never to extend beyond eight, with a short bait.

Care is also requisite in watering horses in the stable; and it should never be given either immediately before or after their corn, unless they first eat some hay. On the road they may be watered moderately, and then put gently into motion, instead of allowing them to stand at an ale-house door while the carter refreshes himself. Some persons imagine that hard spring-water is the most wholesome for cattle, but horses invariably prefer it soft.

Farm-stables are merely intended to protect the cattle from the weather, for, being much exposed to changes of the temperature, they should never be kept hot; and, as fresh air is an essential element of health, the windows should be merely latticed, like those in granaries, and two or three wooden funnels, according to the size of the stable, should be inserted from the ceiling through the roof, thus forming so many chimneys for the escape of foul vapor. The floors of all stables

should be paved with either clinkers or table-stones, laid close and even, and well bedded under the foundation, as otherwise a portion of the urine will be absorbed by the soil, and will emit a nauseous and unwholesome exhalation. The floor should be slightly raised at the front of the stalls; but the slope should not exceed 3 inches, and that should be provided for by raising the litter behind them, or they will stand in an uneasy position. The doors would be more conveniently placed at one end of the stable than in the side, as the dung will be more easily removed, and a free passage may be allowed to the urine by a gentle slant in the gutter of the pavement at their feet, which may then be conveniently carried off by a drain.

Some very intelligent farmers keep their teams entirely in open yards, or *hammels*, surrounded with well-littered sheds for them to run under at pleasure; and experience has proved that, in this manner, their health may be maintained as well, if not better, than in stables. In the eastern district of Suffolk, horses are seldom permitted to remain in the stable at night, but are turned out when fed in the evening, by which treatment they become hardy, and are neither subject to swelled legs, nor to colds and inflammation.* Such a yard does for the whole year—for summer soiling and winter feeding—but it is attended with the inconvenience of exposing them to accidents when many are thus together; neither can their food be so equally divided, nor can they be kept equally clean.†

Carters have the character of being proverbially thieves—not in the most nefarious sense—but they think it no harm to pilfer corn to pamper their teams: they have no idea of any better mode of feeding than to cram them to the utmost, and, if allowed the free use of hay, they will not only waste it, but, out of mistaken kindness, do the animals serious injury by overloading their stomachs. On every consideration, therefore, of health and economy, they should be allowed. The chaff, as well as the corn, should be weighed or measured,‡ and if hay be given in the racks, it should be bound, and given out in trusses: the expense of binding will be more than repaid by the saving in consumption. Marshall has justly observed in his *Minutes of Agriculture*, that, by stinting the quantity, the men become more careful; they look upon it as something, and know that, if they lavish to-day, they will want to-morrow; thus the servant learns frugality, while his cattle have their food regularly: he will give them a little at a time, and see that they eat it up clean. There is a sympathy between the human and the brute creation, arising from acquaintance, which is more easily observed than communicated. There are carters who would sooner starve themselves than their horses, and among stock-feeders in general, it is obvious to common observation; though this kindness does not extend equally to the bestowal of their labor, and, from habit, as well as idleness, they are very generally neglectful of the essential duties of cleanliness. Much of this must, however, be attributed to their masters, who too

* Suffolk Report, p. 219; Oxfordshire do., p. 283.

† See also the plans of Cattle-sheds in the following chapter.

‡ From 5½ lbs. to 6 lbs. of short-cut chaff, exclusive of corn, fill a bushel measure.

commonly treat them as men not to be trusted, and suspicion naturally begets deceit. There is, consequently, but little sympathy existing between them; but when servants are used with kindness, they often return it with interest, and devote themselves with sincerity to the service of their employer.

Condition is a word of large meaning in the stable of a gentleman; in that of a farmer, whose horses should be kept more for work than for show, it should be understood to mean a sufficiency of wholesome food, evidenced by a healthy, mellow, clean-skinned hide, without much fat,—a lively eye, and a general appearance of health. Common working horses require but little grooming; yet their coats should be kept clear of scurf, and their feet should be well attended to. The rough hair which encumbers their fetlocks is useful in some countries as a protection against flints, but a much less quantity would serve that purpose, and when allowed to remain clogged with dirt, it engenders grease. Through a very unwise economy of some masters, the shoes, too, are seldom removed until they are either completely worn or broken, by which much injury is done to the hoof; their shoulders are galled by want of timely attention to the state of the collars; and time is continually lost by the breaking and patching of the harness. In all these cases prevention is better than cure; and, besides the established regulation of removing the dung and 'setting the stable fair' every morning, as well as seeing that each horse be thoroughly dry and clean, his feet washed, and occasionally oiled and stopped, before 'making up for the night,'—it would be a good rule to have a regular inspection of the cattle, harness, and implements, once every week, even were a portion of the Saturday evening's usual work devoted to that purpose.

TEA PLANT.

Nothing seems more extraordinary than that we should be dependent upon one country, and often upon the will of a capricious government, for a production which may now be considered as a necessary of life in Great Britain. It does not appear that the tea-plant is altogether the production of a low latitude. On the contrary, various species of the *Camellia* of tea-plant seem to be cultivated in China far to the north, and at considerable elevations. Why, then, might not the tea-plant be cultivated to an unlimited extent in Europe; or why might we not produce it in our numerous colonies, possessed of every variety of climate? In Prince of Wales' Island it has been long introduced, and it is known that there is no difficulty whatever in raising it. In almost every part of Hindostan, therefore, the tea-plant could be grown. Nay, there is reason to believe that species of it might be grown in Great Britain as easily as some of our most common shrubs. It is said that the *Camellia viridis*, or green tea-plant, has been recently successfully planted by Mr. Rootsey, of Bristol, in a part of Breconshire, near the source of the Usk, about 1,000 feet above the level of the sea, and higher than the limits of the native woods, consisting of alder and birch. It endured the winter, and was not affected by the frost of the 7th of May, and it has now made several vigorous shoots.—*Quart. Journ. Agric.*

CLIMATE OF ENGLAND.

In a paper recently published in the Transactions of the Horticultural Society of London, Mr. Knight says that he entertains no doubt whatever but that our winters are generally a good deal less severe than formerly,—our springs more cold and ungenial,—our summers, and particularly the latter parts of them, as warm, at least, as they formerly were, and our autumns considerably warmer. In accounting for these changes, our author observes, that within the last fifty years, very extensive tracts of ground, which were previously covered with trees, have been cleared, and much waste land has been inclosed and cultivated; and by means of drains and improvements in agriculture, the water from the clouds has been more rapidly carried off. From these circumstances, the ground becomes more dry in the end of May than it was formerly, and it consequently absorbs and retains much more of the warm summer rain than it did in an uncultivated state; and as water in cooling is known to give out much heat to surrounding bodies, much warmth must be communicated to the ground, and this cannot fail to affect the temperature of the autumn. The warm autumnal rains, in conjunction with those of summer, operate powerfully upon the temperature of the winter; and, consistently with this hypothesis, Mr. Knight asserts that he has observed, that during the last forty years, when the summer and autumn have been very wet, the succeeding winter has been mild; and that when north-east winds have prevailed after wet seasons, the winter has been cold and cloudy, but without severe frost, probably owing to the ground upon the opposite shores of the continent being in a state similar to that on this side the Channel.

Supposing the ground to contain less water in the commencement of winter, on account of the operations of the drains and improvements before mentioned, more of the water afforded by dissolving snows and cold rains in winter will necessarily be absorbed by it; and in the end of February, however dry the ground may have been at the winter solstice, it will almost always be found saturated with water; and as the influence of the sun is as powerful on the last day of February as on the 15th of October, and it is the high temperature of the ground in the latter period which occasions the difference of temperature in those opposite seasons, Mr. Knight thinks it cannot be doubted, that if the soil be rendered more cold by the absorption of water at nearly the freezing temperature, the weather of the spring must be, to some extent, injuriously affected.—*Trans. Hort. Soc. Lond.*

From the Library of Useful Knowledge—Farmer's Series.

MULES AND ASSES.

A beast of draught throws forward as much of his own weight as enables him to overcome the weight, or equivalent resistance, that is behind him; and the more spirited the animal, with the more activity will he exert himself; but, the exertion being measured by its rapidity, velocity is labor in another shape, and though he may draw better for a short space than a heavier and slower animal, yet he will tire sooner: weight is, therefore, the steady power of heavy draught, and is a

chief requisite in horses intended to be used on tenacious soils.

It is this which deprives mules of the power of heavy draught. They carry 20 stone of horse-man's weight, and travel daily upwards of thirty miles through the mountainous cross-roads of the Spanish peninsula. Horses are incapable of such exertions under the pack; but their weight tells when opposed to a carriage with little muscular exertion, when the mule is forced to put forth his whole strength.

Mules are sometimes produced by horses upon she-asses, but are more frequently the progeny of the jack-ass and the mare. The race is, however, in any shape, incapable of reproduction; for, although some rare exceptions to this rule are upon record, it yet seems to be a principle in nature, that all *hybrid* animals—as those are termed which are the offspring of distinct breeds—should be sterile. Mules are highly esteemed in most parts of the south as beasts of burden for either the pack or the saddle; but in this country they are chiefly used for draught. They are more hardy in constitution, more patient, and more muscular in proportion to their weight, than horses; they are also less subject to disease, and far longer lived, for they are commonly able to work during full thirty or even forty years. They are fed, too, at less expense; and, when in the hands of good masters, and treated with gentleness and humanity, the complaints commonly made of their restiveness are wholly destitute of foundation.* They answer well for hard roads, and for harrowing, because the land is then generally dry, and their feet, which are small, neither sink into the ground, nor are they met by the dead pull which they have to oppose in the plough. The cattle, as well as the implement with which they are worked, should be in fact, suited to the soil; and it would be equally incongruous to attempt the use of bullocks upon flinty land, as it would be to employ mules for the ploughing of wet and heavy clay. They have been long introduced into Ireland,† and the breed has been much improved in the north by the importation of a Maltese ass, which is described as having been an animal of a very superior description. Wherever they have been regularly employed in this country their utility has been also admitted; but there is a prejudice against rearing them: farmers generally imagining that they are to obtain some notable animal out of any wretched mare, provided she be only covered by a slightly horse, and thence arise expectations we need not say how disappointed; whereas, had they the good sense to serve them with powerful stallion-asses, something useful might be produced. In Spain, where great attention is paid to the breed of mules, there is a royal stud of stallion-asses maintained at Reynosa, in the Asturias. Were farmers thus to use the small class of mares commonly found upon the moors and mountains in many extensive districts, they would breed a far more valuable stock for their own immediate use, the intrinsic worth of which, for all the common purposes of labor, would soon increase its price. As to the objection arising out of the impossibility of continuing the breed from the same animals, the remark may be met by that of their greater

length of life, which extends to that of double the length of the horse, and no deficiency of the stock is observable in those countries where they are commonly used in labor. It may not either be generally known that, when a mare has not stood her stinting when covered by a stallion, she will, notwithstanding, probably prove in foal if afterwards covered by an ass.*

The appearance and manners of the *domestic ass* are so well known as to render any description unnecessary. The domesticated race is, however, of comparatively recent adoption in Europe, for we are told by Hollinshed that 'our lande did yield no asses in the time of Queene Elizabeth;' and, although in that he is wrong,—for they are mentioned as having been used in this country at a much earlier period,—yet they were probably scarce, and they are even still but rarely seen throughout the north.

Those known in England are an inferior kind, to which no attention has been ever paid; but there are various breeds of a superior species, which might be greatly improved by crossing. The wild ass of Persia, and of Africa,—of which a foal has been recently imported to London, and is now at the Surrey Zoological Gardens,—is known to be an animal of great speed and power. There is also a race of Arabian origin, which is chiefly used for the saddle; and those reared at the island of Gozo, in the Mediterranean,—a few of which have been brought to this country, as stallions for the production of mules,—have reached the height of fourteen hands, and have been sold for the sum of 100 guineas.

Asses are surprisingly little employed by farmers, considering their use and economy, for they are supported by the worthless pickings of lanes and bye-ways, or the scanty refuse of other cattle; and yet they carry heavy loads, and might be made very serviceable in the supply of green food to stall-fed beasts and working stock, as well as in carrying off the weeds from fields when under the hoe; all which might be done with children as drivers, and panniers made to let the load down at bottom. The saving of food by weeding may not amount to much in a money calculation, though many herbs thus thrown away would be found palatable if gathered for cattle; but were these animals only employed to remove the weeds from the ground when hoed, it would be of great service, for at least one half of them strike root again after the first shower, and the remainder, if not eaten, is lost to the dung-heap, whereas that loss would be prevented were they raked up and collected. Their drivers also would be kept employed, which would be found very serviceable to the poor, not alone as an addition, however trifling, to their earnings, but as bringing them up in habits of industry, and as early initiating them into the care of domestic animals, by which their kindness and attention to brutes is found to be very much improved. This is so remarkable in France, Spain, and Switzerland, that sheep and oxen regularly follow their keepers to the field, instead of being driven; and the peasantry, being more accustomed in their childhood to attendance upon animals, in consequence of the general want of inclosures, soon learn to treat them with tenderness and familiarity, which is returned by the increased docility and the improved condition of their charge.

* Survey of Leicester, p. 294.

† Survey of the County of Antrim, p. 337. Young's Tour in Ireland, vol. i. p. 271.

* Complete Grazier, 5th edit., p. 192.

ARTESIAN OR OVERFLOWING WELLS.

The irruption of the water, on first piercing these subterranean reservoirs, is often very violent and is no small proof of the copiousness of many of these wells. Some striking examples of this are quoted from England in the *Bibliothèque Universelle*, t. xxxix. p. 199. A Mr. Brook had sunk a bore in his garden 360 feet deep, and 4.5 inches in diameter, from which the water was discharged so copiously, that it not only overflowed the whole yard round the house, but also submerged the adjoining cellars. The damage was so great that the neighbors lodged a complaint, and the police were required to interpose. Two men now tried to close the bore with a wooden peg, but they were constantly driven back by the violence of the water, even when a third came to their assistance. They were equally incapable of restraining the water by an iron stopper. At last they took the advice of a mason, and planted several tubes of small diameter over the bore, and thus succeeded at last in mastering the water. At a Mr. Lord's, in Tooting, where a bore had been closed, the water worked with such violence under the ground, that it burst forth in a space 15 yards in circumference, and certainly the walls would have been brought down if free vent had not been given to it. This spring, say the informants, on account of the height of its jet, and the quantity of water (600 litres per minute,) is worthy of being in a public square. The stream of a well belonging to a neighbor of Mr. Lord, drove a water-wheel of 5 feet in diameter, and this again set a pump in motion which carried the water to the top of a three-storied house. We quote this passage from an article in *Jameson's Journal*, No. 17, to direct the special attention of the reader to the whole of the interesting and important paper*.

ON ARTESIAN WELLS;

And the employment of the warm water brought from a depth for economical purposes.

Whence do artesian wells derive their water, and how do they acquire their power of ascension, which sometimes occasions in the middle of plains, at a distance from hills and mountains, the surprising phenomenon of spouting springs? are questions which have been often proposed, and very variously answered. The most natural explanation is undoubtedly that which supposes the water of these wells, like that of natural wells, to be derived from the atmosphere, and their power of ascension the hydrostatic pressure of a more elevated reservoir, with which the perforated canal or bore stands in connexion. Sometimes, however, the local relations are such that it is difficult to refer the water to such a source, and then it is that the framers of wild hypotheses stand forth with their absurdities. A late observation, which affords a striking proof of the accuracy of the above explanation, is therefore the more worthy of being noticed.

At Tours, on the Loire, an artesian well, with a bore of 3½ inches, which brought the water from a depth of 335 feet to the surface, was damaged,

* M. Mallat, by an ingenious contrivance, is enabled to make use separately of two kinds of water, sometimes found in a single boring, such as hard and soft water.

and they were obliged (on the 30th of January of the year 1831) to remove the tube till within 12 feet of the surface. The water suddenly rushed out, increased fully to a third more than its former quantity, and continued to flow for several hours. It was now no longer clear as before; on the contrary, it brought along with it a great quantity of fine sand, and surprising enough, also numerous remains of plants and bivalve shells; branches of the thorn, several inches long, and blackened, owing to their residence in the water; further, fresh stems and roots of marsh-plants, seeds of many different plants, and also fresh water-shells, as *Planorbis marginatus*, also *Helix rotundata*, and *Helix striata*. All these resembled those which are found after floods, on the sides of smaller rivers and brooks. This fact is so remarkable, that the truth of it might be culled in question, had it not been accurately determined. There results from it the following conclusions:—

1. The water of the artesian well of the city of Tours must occupy not more than four months in flowing through its subterranean canals, because the ripe seeds of harvest have reached the mouth of the well without being decomposed.

2. As the water carries along with it shells and pieces of wood, it cannot reach its place by filtration through the layers of sand, but must have flowed through more or less irregular canals.

3. The source of this water is to be looked for in some moist valleys of Auvergne and the Vivarais.

The remains of the plants and animals are deposited in the mineral cabinet of the city. As soon as the seeds, five or six in number, are referred to their plants, naturalists will, in places situated higher than the basin of the Loire, be able to make out the points where these subterranean waters are poured out.

It is to be wished that French observers would state how they prove that the waters of this well come from Auvergne, about 130 miles distant. If this shall be proved, the considerable rise of artesian water in other places, where no hills occur near, or where they are bored in the most elevated points in the neighborhood, will lose every thing puzzling.

This rising is sufficiently remarkable to induce us to communicate some examples from Hericart.

Name of the Well.	Depth of the Well from the surface of the place.	Height of the rise above the level of the Seine, at the Point de la Tour-nelle.
St. Owen, - - -	Paris feet. 150.8	Paris feet. 6.2
Same, - - - -	203.2	11.1
Epinay, - - - -	166.2	24.6
Same, - - - -	207.8	33.8
Maison Blanche, near Paris,	121.6	64.6
Mount Rouge, at Paris, -	215.5	80.0

The two last wells, exactly those which rise highest above the level of the Seine, are bored on heights, and hence their water remains considerably under the surface of the earth; also in both the deepest of the bore-holes is still above the level of the Seine, in the first seven metres, in the last about one metre.

In the work of Hericart, a fact is mentioned, which

confirms the view of artesian wells already given. Gullis, in which rivers and rivulets lose themselves are very frequent in the Jura and other similar lime-stone mountains, and there, where the uppermost bed consists of a clayey soil, which opposes the sinking down of the rain, sometimes prove very beneficial in agricultural operations, by carrying away the superfluous water. In some places, M. Hericart remarks, man has imitated this example set by nature, with great effect. The draining of the plain of Palans, near to Marseille, is an example of this. This plain, which is at present covered with beautiful vineyards, was formerly a great marshy basin, without outlet. It was drained by means of great sink-holes, which were sunk down to the underlying porous or cavernous stone, and were connected together by means of a number of ditches or drains. The water which was carried away by these shafts reached, by means of subterranean canals, the harbors of Mion near to Cassis, where it appeared again as spouting springs. Here, therefore, man, without intending it, had artesian wells, not for the purpose of obtaining water, but in order to get clear of it.

The following report, published by M. Bruckmann, Kongl. Wurtemberg, Baurath, in the *Verhandlungen zur Beforderung des Gewerbflusses in Preussen*, 1830, Lieferung, No. 4., affords a striking proof how varied the uses are of artesian wells. M. Bruckmann caused to be bored, under his inspection, from August 1827, to December 1829, at Heilbronn, five bore holes for fresh water, in order to obtain the necessary quantity of pure water for the purposes of two paper-mills, and a flax spinning mill. Two of the bore holes were sunk to a depth of 60 feet, one to 90 feet, another to 100 feet, and one to 112 feet, under the lowest level of the Neckar. In all of them the water rose nearly 8 feet above the level of the Neckar, and on an average each delivered 40 to 50 cubic feet. The purpose of the borings was perfectly accomplished, even to overflow; but the discovery was made, that the water of all the bore holes had constantly a temperature of 54.5 Fahr. This fact led M. Bruckmann to a very important application of this water, viz. heating the mills with it. The paper-mill contained 72,000 cubic feet, a working hall over it 10,800 cubic feet. Both spaces, which contained together 82,800 cubic feet, were the whole winter, 1829-1830, through, warmed by means of this water alone to a temperature of 45.5 Fahr. and 47.7 Fahr., and when without, the temperature was—24.2 Fahr. The thermometer in the mills did not sink lower than 41° Fahr. even when the doors were kept open. Every miller knows well how much labor, time, and expense, it occasions in hard winters to heat daily, and even in a scanty manner, the water wheels, and with what risk of life it is attended. It was reserved for M. Bruckmann, by means of artesian water, to free his water-mills from this burthensome evil. He conducted the running water from the Hollander, which still possessed a temperature of 52.2 Fahr. through tubes in the Wassergasse, and had thus the satisfaction to find that his water-wheels, the whole winter through, even when the external temperature was as low as 24.2 Fahr. never froze.*

* The period will come when we shall be forced to

NATIVE COUNTRY OF MAIZE, OR INDIAN CORN.

From Jameson's Journal.

This grain, so important to the agricultural interests of the United States, appears to be of uncertain origin. Fuchs very early maintained that it came from the east; and Mathioli affirmed that it was from America. Regmir and Gregory have presented fresh arguments in favor of its eastern origin. Among them is the name by which it has been long known in Europe, *Ble de Turquie*; and varieties, it is said, have been brought from the Isle of France, or from China. Moreau de Jonnes, on the contrary, has recently maintained, in a memoir read before the Academy of Sciences, that its origin was in America. The name *Ble de Turquie* no more proves it to be of Turkish origin than the name of the Italian Poplar proves that that tree grew wild in Italy. It can only signify that it spread from Turkey into the neighboring countries. Its general cultivation in southern Europe, and the production of some new varieties, proves nothing with regard to the country of the species. In favor of its American origin, is the fact that it was found in a state of cultivation, in every place where the first navigators landed. In Mexico according to Hernandez, and in Brazil according to Zeri; and that in the various countries it had proper names, such as *Maize*, *Flaolli*, &c.; while, in the Old World, its names were either all of American origin, or names of the neighboring region, whence it was immediately derived; and that, immediately after the discovery of America, it spread rapidly in the Old World, and soon became common, a fact not reconcilable with the idea of its former existence there. To these proofs Aug. de Saint Hilaire has added another. He has received from M. de Larranhaga of Monte Video, a new variety of maize, distinguished by the name of *Tunicata*; because, instead of having the grains naked, they are entirely covered by the glumes. This variety is from Paraguay, where it is cultivated by the Guaycurus Indians, a people in the lowest scale of civilization, and where, according to the direct testimony of one of them, it grows in the humid forests as a native production.

[We have raised a few ears of this curious kind of corn described above under the name of *Tunicata*. The grains are precisely like the common corn, and the ear is of middle size. But besides having a shuck such as covers other Indian corn, every grain of this is completely enclosed in a little shuck of its own. The cob, (if it can be so called,) is scarcely larger than the central pith of the cobs of other ears—and to this are attached by stems or threads, the shucks or glumes which enclose each grain. The whole are regularly and compactly arranged on the ear.]

SHEEP KILLED BY CATS.

Incredible as this may sound, we have good authority for saying the deed has actually been perpetrated in this county. Several cats of the

look out for a substitute for coal. If, when that time arrives, no new means of procuring heat economically shall be discovered, we may be able to draw from the great subterranean depository of caloric, and partly by means of the subterranean waters, heat for our various wants.—*Poggendorf's Annalen*, H. ii. 1831.

common species, with their progeny, have for three or four years past made an old stone quarry, in Martic township, their abiding place, and in that time, it would seem, have relapsed to the wild state, and acquired the ferocious and predatory habits natural to their tribe. A short time ago some of them were seen in pursuit of a full grown sheep, belonging to the flock of Mr. Martin Herr, of that vicinity. They soon overtook it, dragged it to the ground, and before the person who witnessed the scene could reach the spot, they succeeded in so lacerating the poor animal's throat that it bled to death in a short time. It required considerable exertion to drive them off. A dog, subsequently sent in pursuit of them, caught one, but would probably have been himself worsted in the conflict that ensued, had not the owner come to his rescue. It is said that they also pursued a small boy some time ago, and followed him a considerable distance, as is now supposed with deadly purposes.—*Lancaster Examiner.*

MANUAL LABOR DEPARTMENT OF THE LANE SEMINARY.

The fourth Annual Report of the Lane Seminary at Cincinnati, Ohio, has recently appeared, and contains much that is interesting in reference to manual labor.

This institution is another of those "Visible Illustrations of Benevolence," which are so rapidly and so happily multiplying in our country. It owes its origin to the benevolence of a single merchant, and its broad foundation to individual contributions; and the fact that these were chiefly presented by "the East" to "the West," affords gratifying evidence that narrow local feeling is not yet predominant over the spirit of beneficence. The Seminary has three professors in the theological department, and three in the department of preparatory study, which is designed for those whose age or circumstances prevent their pursuing a collegiate course. One building for one hundred students, and two houses for professors, are already built, and a chapel is soon to be erected. In consequence of the provision of funds, the expenses of each student do not exceed \$60 or \$80 annually.

But the principal peculiarity in this institution is in its provisions for manual labor, and the ground on which it is placed. It is with peculiar pleasure that we find "physical education" spoken of, in connection with "talents and acquisitions," and the "spirit of holiness," as of *fundamental importance* to ministerial energy and success. When will the acknowledged truth, that "the mind is influenced by the state of the body," be adopted *practically*, in our schemes of education! On the subject of manual labor in connection with study, the Committee remark in general:

"Whatever may be the theoretical objections of good men, practically unacquainted with this system, to its practicability and importance, it is to the directors no longer a matter of experiment, but of sober fact, resulting from three or four years' experience, that the connection of three hours daily labor, in some useful and interesting employment, with study, protects the health and constitution of our young men; greatly augments their physical energy; furnishes to a considerable extent, or entirely, the means of self-education; increases their power of intellectual acquisition; facilitates

their actual progress in study; removes their temptations to idleness; confirms their habits of industry; gives them a practical acquaintance with the useful employments of life; fits them for the toils and responsibilities of a newly settled country; and inspires them with the independence of character, and the originality of investigation, which belong peculiarly to self-made and self-educated men."

They make one remark, which we presume will explain more than one of those failures which have led some to doubt the practicability of the system:

"No small injury is threatened to manual labor institutions, and no small embarrassment has been felt by this seminary in common with others, in consequence of the erroneous impression too commonly prevalent, that no funds will be needed in a manual labor institution, even when the student has no trade, no knowledge of any kind of business, no power of accomplishment, and little disposition to perform the labor offered him, as a means of paying his expenses.

"The committee need not inform such young men, and the community generally, that no institution can long sustain itself and prosper under such circumstances."

While they consider the pecuniary benefit of the plan as of minor importance, compared with the health and vigor it produces, the report furnishes encouraging evidences that much may be done in this respect under favorable circumstances. In consequence of the contiguity of the seminary to Cincinnati, printing has been introduced as one branch of labor, and the novelty and success of this department renders the details interesting.

"During the early part of the last year, an arrangement was entered into by the committee, with Messrs. Corey & Fairbank, booksellers of Cincinnati, to furnish the students with several printing presses, and with stereotype plates for printing Webster's spelling book. This establishment has been in operation nearly a year, and now embraces six presses, furnishing work for twenty students.

"About 150,000 copies of the above named work have been printed, and about 1000 copies per day are now issued from the presses.

"The students have recently commenced the printing of an edition of Dr. Eberle's Treatise on the Diseases of Children, a valuable medical work, which requires fine paper and the best workmanship; and it is believed that in all respects the execution of the work is highly satisfactory to the employers."

The report from which we are quoting is a very handsome specimen of the skill of the students. In regard to pecuniary results, the committee state:

"The average amount earned by six printers in ten months by working about three hours per day,	\$120 00
"Average amount earned at the same rate in a year,	144 00
"Amount now earned by twenty students per week,	50 82
"Average amount (by each student,) 2 54	
"Average amount earned by twenty students at the same rate as above per year,	132 08

"In view of these results, and the small annual expense of this institution, it is hardly necessary to remark, that the students in this department have

the high satisfaction of providing the means of their own education without aid from friends, or from the benefactions of the church.

"This arrangement is the more important for our young men, from the fact that a knowledge of the business is easily acquired; several of the students having gained such an acquaintance with the employment in three or four weeks, as to be able to earn forty-six cents per day, or two dollars seventy-six cents per week, by working three hours per day.

"This operation is highly satisfactory to the committee, not only as furnishing a useful and advantageous employment to the students, but as it is unattended with any expense to the institution in furnishing presses, or in the printing and disposition of the books. From nearly a year's full experiment, the committee are fully persuaded that this branch of our manual labor has peculiar advantages in respect to its simplicity, its appropriate exercise, its general utility, and pecuniary results.

"In accordance with the special request of the printers' association of this institution, it is intended, as soon as practicable, to adopt measures for the extension of this establishment; and from the facilities here enjoyed for conducting the printing business, it is hoped that a large portion of our students, at no very distant period, may enjoy the advantage of this employment."

In the cabinet shops connected with the institution, materials have been furnished, and work paid for, by an establishment in Cincinnati. The whole is placed under the superintendence of some of the most skilful workmen among the students, who are responsible to the employers for all that is done, and have secured a pecuniary profit of \$701 35 in five months. The profit to individuals is thus stated by the committee:

"Several of the best workmen have earned from twelve and a half to fifteen cents per hour, and have received for their services during the time above specified, from forty to sixty dollars each; while those who have recently commenced learning the business, have earned from ten to twenty dollars each.

"While the fact is here rendered obvious, that a first-rate mechanic is entirely independent in this institution, and can support himself by his three hours' labor without infringing at all upon his study hours, the committee wish it to be understood that such results are secured only by young men of energetic, industrious, and economical habits; and that those of different character, and who have little or no knowledge of tools, ought not to rely, to any considerable extent, at least for the first year, upon their labor as the means of paying the expenses of the institution."

A farm of 110 acres is also annexed to the institution, from which additional advantages are anticipated.

Such are the results of one of the most recent experiments on the manual labor system, and they seem to us to confirm the position we have maintained, that while this, like every other system of education, needs a foundation on which to rest, and the faithful, persevering efforts of skilful agents, it may be made a means of economy in education, and of imparting that vigor of constitution which renders that education doubly valuable, and secures to the individual, enjoyments and hopes which are beyond all price.—*Annals of Education.*

From the New York Farmer.

LIVE STOCK.

Adaptation of Breeds of Live Stock in the United States to the Soil.

Sir,—In some parts of the United States much attention has been paid to the improvement of live stock, and in many instances with success; but in others the improvement aimed at has not been attained, because the varieties of soil and climate had not been duly considered. In looking over the large droves of cattle which are brought from the west every year in October and November, though you see a strange medley of all ages, sizes, and every variety of condition, yet you see the same general character; nineteen out of twenty are red and middle-horned, evidently of the same race as the Devons, Herefords, and Sussex cattle of England. In the droves of sheep, you may look at a hundred without seeing a good one, but amongst any twenty head of cattle, you can always find some good; and what these are, the whole might have been made, by selection and care. Good ones would cost no more to keep, if so much, and would always fatten quicker, and be worth more money.

The great varieties of soil met with, require different kinds of cattle, yet on poor soils, as well as rich, most of our farmers aim more at size than symmetry, and handling is never thought of as an indication of qualities.

It is much to be desired that the farmers of the west, where so many cattle are bred, would attend to the grazing qualities of the stock they rear; and it is surprising that no breeders have attempted to establish a variety merely as milkers. Good cows are to be found here and there, but you look in vain for any uniformity of character amongst them. A permanent variety may be raised in a few years, by useful management in always selecting the best milkers to be found, and putting a bull to them which comes of a good milker.—This is a main point, and not easy to succeed in. A good dairy bull ought to be clean in the head and neck, and altogether of a more feminine appearance than a common bull.

In New England are many excellent cattle, all of the middle-horned kind; by selection for several generations, some parts of that country have now a breed hardly to be surpassed, as uniting the three uses of cattle, that is, for beef, the yoke, and the dairy. Yet they have no kind bred for the dairy as the sole object. In the small territory of Great Britain are many varieties of soil, and many cattle, say from 30 to 40, generally well suited for their places. At the head of all are the Improved Short Horns, an admirable breed, yet from their size, form, and constitution, they can only be kept in favorable situations. If grazed in summer on second rate lands, and kept on hay from the same lands in winter, they would rapidly degenerate; even artificial food would not make up for the want of quality in the grass and hay. Their early maturity would soon be lost with the wretched winter keeping so common here. In their native districts, with a moist, temperate climate, and rich soil, they are fed in the highest manner. Deep old grass land in summer, with abundant turnips, and rich hay, in well littered, well sheltered yards during winter, keep them always up to the mark. On inferior lands they would hardly live, yet there

galloways would get fat; while in the Highlands of Scotland even galloways could not live. Yet in that bleak country is found a breed of cattle perfectly adapted to their situation: small, compact, and hardy, beautiful to the eye of a grazier, and much better beef than the large breeds of the south. Indeed, the richest lands do not produce beef or mutton of so good a quality as lands of inferior fertility, especially of their own rearing. In some fine parts of Scotland the Improved Short Horns have driven out the native breeds; but, on the whole, the Scotch cattle excel all others in their situations, and there are districts of this country, such as the northern slope of the Alleghanies, &c. where it is probable the Highlanders would answer well. A few galloway cattle were several years since introduced by some Scotch settlers in Caledonia, Livingston county, New-York, but have long been mixed, and are now said to be lost. West Highlanders, for bleak mountain lands, and Ayrshires for the dairy, would be a national acquisition.—Look at the noble premiums given yearly by the Scotch Highland Society for the improvement of their domestic animals and for the promotion of agriculture in every way. At their exhibition at Stirling, in 1832, the premium for cattle alone amounted to 361 sovereigns, for about 1730 dollars, and in like proportion for sheep, swine, horses, &c. This looks like being in earnest: the subscribers know that they are spending their money wisely for an object of national importance. It would be no difficult matter to buy at a Scotch fair ten or twenty Ayrshire cows, which would look as if all cast in the same mould, and which would yield, for three months after calving, twenty-four quarts each per day, and so on in proportion. These cows, too, would graze kindly when dry. The Northern Short Horn, used in the dairies which supply London with milk, shows in perfection the art of breeding for a particular purpose, and these breeds are invaluable. Yet in a drier climate and different soil they might not retain their qualities.

Importing cattle is an expensive and hazardous business. To make it answer, several men in different quarters ought to combine their efforts, and unity of purpose and perseverance must be found in all of them. This would be a very difficult matter. But selections from the stocks around him is in the power of any man who has capital and judgement. Cattle here are much better than sheep; for, except some merinoes and Saxony sheep, the native kinds are a strange medley, but all bad, wanting symmetry and weight. The main object of this letter is, that all stock should be adapted to the soil they are put on. I have Leicesters degenerating on lands where Cheviot sheep would have done well; and merinoes put on rich deep lands, where heavy sheep would have got fat. Short Horns, too, may be seen on lands where they do not find themselves at home.

Yours,

H.

AUDUBON, THE AMERICAN NATURALIST.

John James Audubon, a native of Louisiana, has been from early youth addicted to the admiration of nature. In a beautiful country, teeming with animal and vegetable life, the profusion of which at first tended to render him undecided as to the particular path which he ought to pursue, he

at length, struck by the beauty and variety of the feathered tribes, their manners and occupations, their wonderful migrations and their mysterious instincts, resolved to make them the principal object of his study. A pure passion gave energy to his mind. He studied nature, not with the view of immortalizing his name by his discoveries, nor even with a desire of infusing a portion of his spirit into his fellow men, much less with the hope of increasing his pecuniary stores, but simply from an instinctive impulse, an admiration of, a love for, the objects that manifested to him the attributes of their Divine Author. To perpetuate their remembrance, and render them ever present to his mind, he first tried to preserve their skins. But their faded tints, the stiffness which could not be avoided in restoring them to shape, and the consequent want of seeming animation, determined him to represent them by the pencil. Numberless drawings were made, but year after year they were consigned to the flames. At length, beginning to be somewhat pleased with his attempts to imitate nature, he commenced a collection of drawings, which, after more than twenty years of almost unremitted observation of the habits of birds, and after he had shot and examined specimens of all the forms that he could find in the vast regions of the United States, at length amounted to several hundred. Still he had no other object in view than that of studying and depicting nature. Finally, after a visit to Philadelphia, which had opened his eyes to the ways of men, he began, in the solitude of the forest, to commune with himself as to the possibility of laying his labors before the world. "Happy days, and nights of pleasing dreams!" says he, "whom the wise men of the west had denounced as a wild woodsman, and whom, even his friend, the Prince of Musignano designates as a 'painter-naturalist.'" "I read over the catalogue of my collection, and thought how it might be possible for an unconnected and unaided individual, like myself, to accomplish the grand scheme. I arranged my drawings, improved them as much as was in my power; and, as I daily retired farther from the haunts of men, determined to leave nothing undone, which my labor, my time, or my purse could accomplish." The "grand scheme," however, was destined to be accomplished,—at least it is in progress. Mr. Audubon left America and came to England. His native country was either unable to appreciate his genius, or unable to aid his efforts, and England did both. The Americans may justly be proud of their achievements, and no people can be more disposed to boast of their good qualities; but, although they may boast of an Audubon, they must leave to England the merit of having fostered him.

"As I approached the coast of England," says he, "and for the first time beheld her fertile shores the despondency of my spirits became very great. I knew not an individual in the country, and although I was the bearer of letters from American friends, and statesmen of great eminence, my situation appeared precarious in the extreme. I imagined that every individual whom I was about to meet might be possessed of talents superior to those of any on our side the Atlantic! Indeed, as I for the first time walked on the streets of Liverpool, my heart nearly failed me, for not a glance of sympathy did I meet with in my wanderings

for two days. To the woods I could not betake myself, for there were none near. But how soon did all around me assume a different aspect! How fresh is the recollection of the change! The very first letter which I rendered procured me a world of friends. My drawings were publicly exhibited and publicly praised. Joy swelled my heart: the first difficulty was surmounted. Honors which, on application being made through my friends, Philadelphia had refused to grant, Liverpool freely accorded."

It is unnecessary to follow Mr. Audubon in his progress through England. Suffice it to say, that in Edinburgh, he commenced the publication of his "Birds of America." After a few plates had been presented to the world, difficulties occurred. The engraver, Mr. W. H. Lizars, expressed his satisfaction at being relieved of the work, which was transferred to Mr. R. Havell, jun., a London artist, who has continued the engravings. The work commenced in 1827, and already the first volume, consisting of 100 plates, is completed. It will be followed by at least three of equal size.

On inspecting the plates in succession, one cannot fail to be struck by the peculiarities which they present. The most unpractised eye must instantly discover something in the aspect and attitudes of the birds, which he has never seen in art, and to obtain which recourse must be had to nature. The cause of this is to be found in the circumstance of the author's having borrowed from living nature. Others draw not from birds but from dried skins. Their representations are as stiff and distorted as it has pleased the bird-stuffer to make the originals. Mr. Audubon's method of representing birds is as follows. Finding in the woods, the prairies, or the fields, a bird which he is desirous of figuring, he follows it, steals upon it unperceived, as the Indian steals upon the white man in his encampment, observes its motions and attitudes, studies its peculiarities, and then shoots it. He restores it to its favorite or characteristic attitude, by a method which, some years ago, he exhibited to the Wernerian Natural History Society of Edinburgh, and while it yet retains unimpaired the rapidly evanescent hues of its eyes, bill and feet, he transfers its semblance to his paper. The bill, the claws, the scales of the tarsi and toes, the feathers, and every other part of its exterior, are carefully measured, and the drawing becomes a fac-simile. Even this method, precise as it is beyond any other, will not necessarily lead to perfection. We know persons, who, although they are acquainted with it, blunder on as they have been wont to do, producing birds with three joints in their hind toes; legs, the origin of which is any where but in the right place; necks like a distaff enveloped in tow, and feathers formed of hogs' bristles. There must be an intimate knowledge of the habits and peculiarities, of the whole family history of the different species, together with a proper acquaintance, not merely with the rules, but with the resources of art, before perfect representations of birds can be produced. As no mere naturalist can represent a bird, so can no mere painter; we have witnessed the attempts of both, and the results were wretched caricatures. He who would figure animals must be indeed a "painter-naturalist."

Let any man conversant with birds lay before him any number of these plates selected at ran-

dom, and he will instantly and unhesitatingly pronounce them true representations of nature. The characteristics of the species are present, the forms and attitudes are copies, the occupations are disclosed, the imagination of a poet has presided over the arrangement. From these plates, there is more to be learned by the student than he may at first imagine.

Observing nature with the eye of an enthusiastic admirer, Mr. Audubon has traversed the dark forest of America, following the track of the discomfited and disconsolate Indian, has penetrated her cane-brakes and cypress-swamps, teeming with the loathsome and dangerous forms of reptile life, visited her ocean-lakes, wandered by the verdant margins of her magnificent rivers, and paddled his solitary canoe over the floods that have spread consternation and terror among the inhabitants of the alluvial plains of her midland regions. This, then, is the man, and not he who, seated in comfort by his table, fancies how things should be, from whom might be expected the completion of the descriptions of others who have pursued the same method.—*Jameson's Journal.*

MONGRELS BETWEEN A DOG AND A SHE WOLF.

Dr. A. F. Wiegmann, Jun. relates the following circumstance as occurring at the Isle of Peacocks, near Potsdam. A setter dog copulated with a she wolf; and she afterwards gave birth to three female pups, differing very much from each other. One, which died, resembled a wolf more than the two others, particularly in the hair, having, on the anterior parts of the legs, the black line which characterizes that animal. The second also resembled the mother, excepting in the position of the eyes, which was the same as in the dog. The third was, properly speaking, a setter dog, but imperfect in some respects; its character was gentle, whilst the others had a ferocious appearance. The father was white, with brown spots; of the little ones, on the contrary, the first had the hair and color of the wolf; the second was white on the throat, cheeks, and on the sides of the neck, and black on the back; and the third had a white band on the fore part of the neck, and between the legs, the back of the same color as the second, and the ears rounded, pendent, and of moderate length. The tail was not erected in any of the three.—*Isis.*

THE COLD WEATHER IN MAY.

From the Petersburg Intelligencer.

The remarkable state of the weather during the past month is the subject of frequent notice in our exchange papers. The Philadelphia Gazette of the 29th ultimo, says: "The weather to-day, in this vicinity is exceedingly disagreeable—cold and unpleasant, with a smart gale from the north east. Overcoats and parlor fires are again in requisition." In Pittsburg, about the middle of the month, the mercury in Fahrenheit's thermometer fell to 25 degrees, and the ground was frozen to a considerable depth. A paper published in Armstrong county, (Penn.) gives the following account of a singular phenomenon which occurred in that section on the 13th May:

"From the intense coldness of the atmosphere all the insects were frozen, so that nearly all kinds of small birds, that subsist on such fare, were pe-

rished with hunger and cold. We have been informed that sacks might have been filled with red and brown birds from the banks of our waters in a short time. Many flying into houses, or perching themselves along side of persons seated out of doors. Others would alight upon the seats or row-locks of crafts when in the river, instinctively seeking relief from the hand of humanity, and when taken up in the hand would expire, supposed to be overcome by the heat of the hand. Our frosts have been so severe as to kill almost every kind of vegetation. It is said that the rye has suffered greatly—the gardens and fruit are destroyed, excepting such roots or seeds as had not put forth their tender buds or seeds, and even the early wheat has suffered material injury."

The Keene (N. H.) Sentinel, states that the snow storm of the 15th May, was very severe in that vicinity, the snow-drifts as in February. West of the mountains it was a foot deep on a level. The Rutland Herald says the storm raged with fury from 8 o'clock Wednesday evening to Thursday afternoon. The snow fell 12 inches.

QUERIES ON BUCKWHEAT AND MILLET.

For the Farmers' Register.

Will some one of the many able correspondents of the Farmers' Register, inform H. through the medium of its pages, whether buckwheat is as great an impoverisher of land as oats, and whether if turned in, it becomes a good fertilizer? What soil is best adapted to its growth, and what quantity is generally sown to the acre? Is millet made to any extent in any of the United States? What soil suits it—is it an exhauster—and what is the price per bushel?

The object of these enquiries is to ascertain what cheap grain crop is most suitable to sow on poor light sandy land, in lower Virginia, on which clover will not grow, in consequence of the summer droughts, and where the fields of this soil are so extensive that the process of enriching them by manures, is too slow.

May 27th, 1834.

H.

MANURE MAKING.

To the Editor of the Farmers' Register.

King William, May 29th, 1834.

Having no marl I determined to make an experiment in the way of manuring with leaves, &c. from the woods. My force consists of a mule, a small boy and a woman. With these I get out from twenty to twenty-five loads a day, and manure one acre per week, at the rate of one hundred loads per acre. I use hoes in scraping up the litter and take off something like an inch of the soil along with the leaves. I also keep my stable yard well covered with leaves, say two feet thick; upon this, the manure from the stable is daily spread and the whole covered thinly with red clay every morning. The slops, soap-suds, &c. from the kitchen are carefully saved in barrels, provided for the purpose, and poured upon the heap. This manure, I intend carting out at the expiration of every three months, and then commence another heap.

Can you, or some of your experienced subscribers inform me whether it would be better to cart

and spread immediately this woods litter, or suffer it to remain in heaps until the winter or spring? I am inclined to think, land would be much improved by being protected during the summer, previous to cultivating it, by a cover of leaves and mould from the woods.

E. H.

SHELLS ON THE SNOWY MOUNTAINS OF THIBET.

At a meeting of the Asiatic Society of Calcutta, on 5th May last, extracts from Mr. Gerard's letters, relative to the fossil shells collected by him in his late tour over the snowy mountains of the Thibet frontier, were read. The loftiest altitude at which he picked up some of them, was on the crest of a pass, elevated 17,000 feet; and here also were fragments of rocks, bearing the impression of shells, which must have been detached from the contiguous peaks rising far above the elevated level. Generally, however, the rocks formed of these shells are at an altitude of 16,000 feet, and one cliff was a mile in perpendicular height above the nearest level. Mr. Gerard farther states, "Just before crossing the boundary of Ludak into Bus-salier, I was exceedingly gratified by the discovery of a bed of fossil oysters, clinging to the rock as if they had been alive." In whatever point of view we are to consider the subject, it is sublime to think of millions of organic remains lying at such an extraordinary altitude, and of vast cliffs of rocks formed out of them, frowning over the illimitable and desolate waters, where the ocean once rolled.—*Asiatic Register*.

PACKING FRUIT TREES FOR EXPORTATION.

As soon as the tree is taken out of the ground, the roots are dipped in a thick mixture of earth and water. The roots are then tied in bundles, and dipped in all at once, and a mat is lapped over them, to keep the earth round them together. They are afterwards placed in a box, and a piece of wood is fixed across the box, over the top part of the roots, to prevent them from moving, as the branches are not lapped up at all. Trees packed in this manner, have remained in the above condition four months; and, when unpacked, the roots were throwing out new fibres. This occurred last spring; and, although the season was so unfavorable, the trees made exceedingly fine strong shoots. The plan adopted by Messrs. Buel and Wilson, of the Albany nursery, in packing their fruit trees, is as follows: They dip the roots well in a mixture of earth and water; but instead of lapping the roots in a mat they lay them in the end of the box, and fill in between them with wet moss; so that the lid of the box presses against the moss and thus prevents the roots from being shaken.

IMMENSE QUANTITY OF FOSSIL BONES IN SIBERIA.

M. Hendestrom, who was appointed in 1808, by the Russian government to visit the coasts of the Icy Sea, from the Lena to the Colyma, states, that he has seen in the ice thousands of mammoths, rhinoceroses, buffalos, and other fossil animals.—*Jour. de Geol. II. No. 7.*

INTERNAL IMPROVEMENTS OF NORTH CAROLINA:
LINA:*An Address to the people of North Carolina.*

So much interest has been expressed, through the press and otherwise, in the proceedings of the convention which met at the seat of government in November last, for the purpose of deliberating on the expediency of improving the transportation of the state, that it is almost unnecessary to call to your notice the fact that by a resolution of that body, their president was authorized to appoint a committee of ten to disseminate information on the subject of internal improvement and to publish an address. The appointment of that committee has been made public, and in performance of the duty given in charge to them by the convention, they respectfully ask of their fellow-citizens their serious consideration to a well meant attempt to bring before them in a plain and unpretending manner the causes of the admitted depressed condition of the industry of the state, and of the remedy, from which in the opinion of the convention (and of the committee) relief may be expected. As this subject is of vital concern to yourselves, and as it is inconceivable that the convention can have taken upon them the trouble and responsibility of devising and recommending a plan for the improvement of our inland transport, from any other motive than the common good, it is hoped that no apology will be necessary for the demand now made on your time and attention.

That North Carolina, with an extensive territory, with a fine climate, with equal and just laws, with a numerous and intelligent and moral and industrious people, has neither the internal prosperity nor the political influence, which would seem to be necessary results of these natural and social advantages, none can deny. More than a century and a half has passed away since the settlement of this country by our ancestors, and what improvement has been made in the resources and wealth of the state? We have in the course of events, after a long and bloody war, with great glory to ourselves, effected a separation from the parent country, and become a free and independent state, under a written constitution which secures to us civil and religious freedom. Since our independence as one of the United States, we have attained in an unparalleled short time the rank of a first rate power. We have little reason to expect a foreign war, and nothing to fear from it, and we are secure in our property and persons by our written constitution, from any exaction or oppression under the laws, or under color of them, and in our love of freedom and public spirit we have, we trust, a sure vindication from any attempt on our liberties in contempt of the laws. It is surely a subject of honest pride and of sober gratulation that we are a free people, and, being so, we ought to be what we surely are not, a prosperous people. Apart from our political institutions and our freedom under them, and of the rapid and great increase of our population, in what do we differ from our ancestors? We have the same noble domain, the same benignant climate, but what have we done for ourselves? What monuments in the useful or fine arts; what cities, what large towns, what harbors, what canals, roads and

bridges; what literary or humane institutions; what hospitals, what public libraries, what colleges* or schools, what literary or scientific works have we to be proud of? Not only our foreign commerce, but our very coasting trade is carried on in a great measure by vessels owned and navigated by the citizens of our sister states. We have no mercantile marine beyond a few miserable coasters, and a few keel and steam boats of inconsiderable burthen and value for our inland trade, and some of these are owned in a neighboring state. We have nothing that deserves the name of manufactures. No processes for changing the value of the raw materials which are in use among us, except those effected either by manual labor or by machinery of the simplest and commonest construction. Flouring and saw mills and a very few paper mills, and machines for spinning coarse cotton thread, constitute the total of our manufacturing establishments. Our *agriculture*, on which the whole of our labor has been expended, is far, very far from being much distinguished for practical skill or science. The lands, for the last thirty years *only* have been in some parts of the state, well tilled; but no system of a rotation of crops or of manuring, by which the lands might be maintained in their original fertility and productiveness, has ever been attempted. Far less has it ever been thought of that they were capable of being rendered every year more productive.

With a total absence of commerce, of manufactures, and under a defective system of agriculture, is it surprising, that there should be little accumulation of capital among us except in the increase of our slaves. Our lands have had forced from them a support of our white and colored population, without any view to an increased consumption, and when they would no longer support us, our fellow-citizens, with their children and slaves, without waiting for the slow but certain approach of poverty, have wisely for themselves, and under present circumstances, fortunately for us, sought competency or wealth in the fertile and wild lands of the west and south-west. It is confessedly the great and crying evil of the state, that our labor, (the only source of wealth) is unproductive, and that there is a consequent want of capital for the purposes of commerce, manufactures and agriculture. A most striking proof of

* It will be understood by the public in pressing on their attention the want of literary institutions that the University of North Carolina is not forgotten by us. With all who love the state, we remember with pleasure, and acknowledge with pride the debt of gratitude due to the trustees, and especially to the professors of the University for the benefits they have conferred on the state. To their praise be it mentioned, that they have manifested a devotedness worthy of the good cause in which they have been so long engaged with so little profit to themselves, and so much to their fellow-citizens. They have, not only with no sympathy from our public men, but against every discouragement, accomplished much good with little means.

We refer with pain to the neglect of those, who by the constitution, are entrusted with the sacred duty of providing for public instruction, and only for the purpose of expressing the hope and belief, that ere long, they will extend an effective patronage to the University. They may then establish a just (we would that it had been an early) claim to being the promoters of useful learning among us.

this is to be found in the history of our banks. For many years we have had \$3,200,000 of banking capital in the hands of joint stock companies. The charters of these companies are just expiring, and one of them *only* has applied for a renewal of the act of incorporation, and although the legislature have granted to new companies very favorable charters, it is doubtful whether the stock will be subscribed, so as to allow any one of them to go into operation. If the stock of the bank of the state be taken to an amount which will entitle the subscribers to claim corporate rights, it will be the only one of the three banks to which charters are offered, that will be able to raise a capital, and this bank will not have more than \$600,000 of the \$1,500,000 of stock which it is at liberty to employ. Now there can be but three ways of accounting for the disappearance of so large an amount of our banking capital; either it has been withdrawn from the business of making loans on interest, and vested in property in this state, which with the same risk will yield a larger profit than has been heretofore made by banking operations, or secondly, it must be supposed that owing to the diminished profits to be made on the cultivation of lands, that persons in safe circumstances cannot afford to pay six per cent. for loans to any large amount. And that either fewer discounts will be made; or the risk of loss on those made will be greater than heretofore, so that the net profits of banking capital will be hereafter less; or thirdly, the capital must have gone to other states where it is expected to be more productive. It will be foreign to the purpose of this address to pursue this topic further than to show from it, that capital is at once scarce and unproductive, and it is only necessary to say that there is no business now followed in this state that will give a profit at all equal to that formerly derived from bank stock, and therefore the first cause supposed has no effect in withholding capital from the new banks, and it is solely ascribable to the other two, and principally to the latter. It is but one more melancholy proof of the depression of the profits of labor and capital among us.

It were alike unwise and unfeeling in us thus to expose the weakness of our native land, if it were not necessary to trace our maladies to their remote causes, that they may if possible be cured. As these causes are well understood, and generally admitted, it will be sufficient for our present argument, to omit all minor ones and to point out those only that are most important.

Our first and greatest disadvantage is without doubt the poverty of our lands. Scattered over our territory and especially on our rivers, we have tracts of land of surpassing fertility; but the general character of our soil, if not absolutely sterile, is at least churlish and ungrateful, making very scanty returns for the labor expended on it. The *second* cause of the diminished and diminishing profit of our labor is the low price of our great staple cotton. The wonderful improvements made in machinery for the ginning of cotton, and converting it into thread and cloth by diminishing the price of fabrics made from it, has increased the consumption of them many thousand fold beyond what the most sanguine imagination could have anticipated thirty years since. The demand for the raw material has of course been increased in

exact proportion to the consumption, but great as that is, and although constantly increasing, the plant is capable of being grown in so many latitudes, and over so large a portion of the earth, that the supply has more than kept pace with the demand. The necessary consequence has been that the price, although subject to many fluctuations, has eventually greatly declined. This has fallen with more weight upon us because of the more limited and costly production with us than in richer soils and warmer climates, and especially in the states south and west of us. The more southern states, from the strength of their soil and the adaptation of their climate to the culture of cotton, with less labor, receive a much greater return from the acre than we do, and of finer staple; and of course are able to sell to the manufacturer at a less price, with greater profit. From the great law of exchangeable value, they can receive nothing from the manufacturer beyond a fair profit on their capital and labor, and we, who enter into competition with them, must of course be content to sell what cost us more, at less price, and must necessarily receive less profit. But as we make larger profits on the culture of cotton, than we receive on other exports, we have for a succession of years constantly increased our production. And although our skill in the culture has enabled us to lessen the costs, the little profit we are able to realize from it is the most prominent cause of the depression of our labor.

The third cause arises from the cost of transporting our products to a market. The great rivers which flow from the west to the sea throughout the state, are interrupted in their courses by falls and other obstructions, so that they do not admit of inland transport for any distance from their mouths. This evil is the greater, as the staples of the country are generally of great weight and bulk, and when they are brought to market a considerable part of their value consists in the cost of their transportation; and in very many of them of the easiest production and in the greatest demand, (for instance, wheat and Indian corn made in the middle and western counties) the cost of transportation is so great that it amounts to a total prohibition of the export. The cost of import, from the same cause it is apparent, bears heavily on many bulky articles necessary to a successful cultivation of the soil. An exorbitant price is paid for salt in some counties, and even for iron, the most necessary of all the gifts of nature to the prosecution of agriculture and the other useful arts. Gypsum and lime, so essential as manures, are altogether out of our power, from the high price of carriage. This third cause, the great expense of transport, as it is very obvious, is also one of the greatest obstacles to the creation of wealth in this state. The fourth and last to be mentioned is the want of one or more safe sea ports within our limits. The mouths of our sounds and rivers are in almost every instance obstructed by sand bars and shoals. It is admitted that good ports would be of great advantage to us, and yet with deference to those of our citizens who hold this to be the prime obstacle to our improvement, we apprehend that more importance has been attached to this want than belongs to it. It is not doubted that a sea port is always of value to a country, and that it is of the greatest consequence where it forms the access to a fertile country; but

that it is not of the highest value in itself, without a back country to support it, is we think very apparent from the present state of the town of Norfolk, Virginia. It is undoubtedly one of the finest harbors on the continent, if not under all circumstances the very best, and yet though it is as old as most of the large cities in the Union, and has of late years received a great deal of patronage from the general government, it is a town of not very high rank in point of population, and does not, we believe, abound in capital. A little attention to the history of the large commercial cities at home, and abroad, will show that they are the concomitants of a successful state of manufactures and agriculture, or that they have been consequent on them. And that unless in a few instances, where they have enjoyed a carrying trade, or been connected with fisheries, they have never preceded agriculture and manufactures. These causes are without doubt sufficient for the effects ascribed to them, which ever of them be most important. The want of a foreign trade and of manufactures, and the existence of an unskilful husbandry are sufficient to depress the industry of any people, and must continue to keep it depressed unless they can be removed or counterbalanced. Though difficult, it is by no means impossible to find a remedy for all these evils. During the century and a half we have been a political community, we have done something for ourselves under the weight of all these disadvantages, and we can, if we will but resolve on an united and continued effort, triumph over them. We are not without the means of making a complete change in our agriculture, which as it is the natural occupation for our capital and industry should be our first and chief care. If we have the will, we have very certainly abundant ability to make this change. We have, as has already been said, an extensive territory, which though heretofore it has not afforded much spare wealth, has supported a large population in comfort. Our lands, if not rich, are not so hopelessly sterile, but that by labor and capital judiciously applied, they may be made productive. If once we can improve our soil to an equality with that of our neighbours, we may counterbalance the advantage they have in the growing of cotton and other staples by lessening the cost of our transport to market. If we can thus greatly increase the value and amount of our agricultural products, we will acquire a capital in lands and money, and at no very remote period be able to commence manufactures, for which we have great aptitude, especially in the mildness of our climate—the cheapness of provisions, and the water power which is afforded by our rivers and their tributary streams.

Our agriculture being freed from its embarrassments, we may even attempt, with a fair prospect of success, the improvement of our own ports and the commencement of a foreign commerce from them, or perhaps what will be more feasible and equally profitable, an active coasting trade. Our first step to improve the resources of the state—to increase our profits, and thereby to create or to enlarge our capital, must be made in bettering our agriculture. Our extent of territory, a large proportion of it yet covered with the native forests, invites to the cultivation of the soil. The predilections of our people are for a farming life; their skill and capital, ever since the settlement of the country, have been turned to it; our interests, our

inclinations and our habits have made us farmers, and will keep us so. It is alike the result of our natural situation and the dictate of sound sense, that our whole energies should be directed to the subduing our wild lands to the dominion of the plough. When we have a greater capital acquired from a successful cultivation of our lands, than can be profitably re-invested in their improvement—when our population begins to grow larger than can find room for a gainful industry upon their native fields, (if we are a prosperous community) our excess of capital and labor will be turned under individual enterprise towards mechanical employments and foreign trade for advantageous occupation. But assuredly if any thing may be affirmed as being beyond contradiction, in regard to our present condition or future prospects, it is, that we are, and must continue, for not less than a century, chiefly, if not exclusively an agricultural people. Nor let it be forgotten, that of all the employments by which man earns a subsistence, or looks for profit, it is the most primitive, (and notwithstanding much misrepresentation to the contrary) among the most profitable and peculiarly favorable to health, to innocence and to happiness—to the cultivation of the domestic and public virtues—to make us good men and disinterested patriots.

All premature attempts to make us either foreign traders or mechanics, will not only certainly fail, as we have neither acquired capital or natural fitness for these occupations, but are not even desirable, as nothing is to be gained, either in point of wealth or happiness, by abandoning our present pursuits. Foreign trade, mechanical industry and the cultivation of the soil, as sources of national wealth, have each found at different periods, and in different countries, its advocates, who have extolled the favorite pursuit, at the expense of the other two; and on account of its supposed pre-eminence, have claimed from government, bounties for its encouragement or duties for its protection. We must not be understood so to advocate agriculture. All these three sources of wealth are looked upon by us as being in themselves on a perfect equality, and that one or the other, or all of them at once, are to be followed by any people according to the means they have, by nature or art, for a successful pursuit of them. We are of the number of those, who believe it best, that individuals should be left by government to follow their own interests, and that in general, nothing more is necessary for the protection of industry, than equal laws and an economical public expenditure. An exception is of necessity to be made to the doctrine of non-interference on the part of government, where there is some enterprise for the public welfare of such magnitude, that it requires the wealth and credit of the state to carry it into effect, or some obstacle of such difficulty, that it is obviously not within the power of individual capital, or that of private association to remove it. Such, we think, is the case with us at present. We believe that nothing less than the wealth and credit of the whole state, at the disposal of the people themselves, through the general assembly, can so improve our inland transport throughout our whole limits, as to place our industry on a level with our competitors in other states.

It has been the practice of all wise rulers, to make works of national importance, at the com-

mon expense. Fortifications, navies, ports and public ways and many other things, in their nature of *general* interest, have ever been supposed to be within the proper care of the government. Even our imperfect system for making and repairing roads, has been, and now is, strictly of public concern. Our highways have been for their more convenient administration, considered as part of the county police, and placed under the care of the county courts; but thus, under the direction of public functionaries, they are as much subjects of sovereign care, as if they were directly controlled by the general assembly.

We will now inquire, how far our industry would be benefited by the adoption of a system of internal improvement; for it is by no means assumed by us, that national wealth will follow, under all circumstances, from the making of canals or rail roads. Gain or loss will flow from an expenditure of labor on these works, as in all other cases; as the works themselves may be needed or not, and may be well or ill planned and executed. Nor do the public, as has been sometimes erroneously imagined, venture upon a public work on other terms than an individual does on a private one. It has been thought by some, that as the citizen is paid for his labor and materials on the public work, that even if the work does not repay, that there has been only a transfer of capital from the government to the citizen, and no loss. But this is a very manifest error. There is an absolute loss of labor and materials to just the amount that is not re-paid; for the labor and materials might have been applied to a work that would have reimbursed them by its profits, with interest; and the public having paid for them and misapplied them, has lost them. It is not otherwise, with an individual. If he has work done, he pays for the labor and materials, and he who does the labor and sells the materials, being paid, is no loser. So, if the proprietor has in the work something that will repay his expenditure with a reasonable profit, he is safe; but otherwise, if he has not, he has incurred an absolute loss.

It is impossible, from the want of statistical information, to make any estimate of the amount paid by the citizens of North Carolina, or of any particular district in the state, in money or labor, for inland transport; and therefore, it cannot be shown what will be the saving effected by any rail road or canal that has been proposed. Nor can it be conjectured, what will be the increase of production from such road or canal. This important information can only be obtained from surveys and reports made under legislative enactment, and at the public expense. But, in the absence of such useful knowledge, actually denied us by our last assembly, we are not without facts, both as to the effect of improved ways in other countries and in this, to show that we may expect the greatest advantages from the improvement of our means of transport. We know that almost the whole of our produce from the middle and western counties is carried by wagons from the farms on which it is grown, to some town in this state, or more generally in another state, accessible to river boats or sea vessels—that it is sold there or delivered to a commission merchant, to be sent to a more favorable market. This carriage over land is exceedingly expensive, because only very light weight can be drawn at a very slow pace over our ill-made

roads. The cost of the wagons and teams employed in transportation in our western and middle counties is not a light sum, but it is a mere trifle to what is expended in the support of the horses and the hire and support of the men employed on our inland carriage. If an estimate could be made of expenses, we do not hesitate to believe, that the saving which might be effected in it for a few years, on an improved system of public ways, would be sufficient to make all the rail roads that have been projected. Our Eastern people are better off; they have very generally water carriage, and yet it has been shown by calculation, that the industry of a few eastern counties is taxed, annually, to the large sum of \$335,000, in delays and in overcoming by lighterage, &c. a single obstruction. In speculating on the expediency of improving our country by making land and water carriage, quick and easy, it has been usual to make a comparison between this state and New York, since the cutting of her grand canal, and between this state and England, in the present highly improved and improving condition of her high ways by land and water. The great wealth derived by New York and England from improvements by roads and canals, is very encouraging to us, who wish to enter upon similar enterprises. But our physical and social condition, and that of New York and England, are so dissimilar, that any reasoning derived from their example has only a general application to us. Every one knows, what an immense and rapid increase of wealth has been the result of the great canal in New York and we need not dwell on it. There are facts connected with the improvement of the roads and canals in England, not so generally known, that hold out to us the most animating encouragement. It may not be known, that in England, all roads were repaired by contribution in labor to the reign of Charles II. (1650) and that not until 1767, (just sixty-seven years ago,) was the system of improving the great roads in that kingdom, by tolls taken for carriage and travelling on them, made general. It is more remarkable, that as late as in the year 1763, there was but one coach running between Edinburgh and London; it set out once a month and was from twelve to fourteen days on the journey. In 1825, there were six or seven daily coaches, and they take forty hours between the two cities—distance 400 miles. All the provinces are now traversed by stage coaches, on turnpike roads, averaging a speed of ten miles per hour. In 1755, the first act passed in England for a public canal, and in 1759, the Duke of Bridgewater obtained his first act; and the complete success of his canal led to the general adoption of canals in England. Now the whole kingdom is intersected by canals for trade and passage, the details of which would be foreign to this address; and since the invention or rather the perfecting of railways and the application of steam power to the attraction of loaded carriages on them, they are every where erected and erecting, and passengers are carried on them at a speed of from twenty to thirty miles, and merchandise at an average of fifteen miles per hour.

Wonderful and interesting as these facts are, they are equalled, by what has been brought to pass in our own country, and even in our own state. The fact, that our post office system began in 1764, has not, perhaps, attracted the attention it deserves. In that year, a sum of £133 6s. was

allowed by our general assembly to the postmaster general of the provinces, for establishing a mail, for twelve months, from Suffolk to the southern boundary of this province; probably, the only mail then within our limits. In 1765, the following year, a committee of the assembly was raised to contract with the post master general for a mail from Suffolk to S. Carolina. As late as the year 1804 or 1805, the mail was transported from Petersburg to the South, in a sulky or gig, twice a week. Now, daily post coaches ply between Petersburg and Raleigh for the conveyance of letters and passengers, and a rail road extends part of the route from Petersburg to the Roanoke river, on which there is a transit at an average speed of fifteen miles per hour. And inclusive of the route through Raleigh there are no less than six lines of post coaches crossing the state from north to south three times a week, two to the eastward of Raleigh, and three to the westward. Besides, there are several lines of post coaches running west and east from Raleigh, and one running from the head of the Petersburg railway west; and there are lateral lines connected with these great routes. By the northern lines, the passengers reach Washington City in three days, Philadelphia in four, and New York in less than five days from Raleigh. It must be, that a system of conveyance which has sprung into such consequence as a public convenience, and on which such an amount of capital has found profitable investment in the short space of thirty years, demands that it should be further improved by adopting the best roads and machines for locomotion which the genius of man has devised. If in this short period, we have passed from the humble conveyance of a gig on a single road, bringing a few antiquated letters at a rate, (stoppages included) perhaps not averaging a mile an hour, to having every considerable town in our state, visited daily, or at most in every two or three days, by four horse coaches, loaded with persons and intelligence fresh from every quarter of the globe, we may, nay must, (we should say) venture upon an expense necessary to construct rail roads travelled by steam power, which would not only carry us and bring our letters and periodical literature at a speed of from 240 to 360 miles in the twenty-four hours, but would transport hundreds of tons of our products and of our imports in foreign necessities and luxuries at the same rate, with perfect safety and with the most definite certainty as to time. Such an amount of stage coach travelling conducted into the state, on one or more railways from and to proper points, on our northern and southern and eastern and western boundaries, would surely pay tolls on passengers and letters and papers at so high a rate that our exports and imports might be carried at a proportionably low rate. They might thus be relieved from the enormous tax with which, according to the present mode of carriage they are burthened. On this part of the subject, it is pertinent to remark, that our internal improvement convention had information before them on which they could implicitly rely, that the stock of the Petersburg railway was profitable, and that of its daily or weekly profits, the larger share was received from the transport of passengers. The importance of this fact to our enquiry cannot be overrated: for we have the power to extend this very rail road through a country as rich as that between Petersburg and the Roanoke, and of con-

tinuing it along the same travelling route to the south, from whence the Petersburg railway has received its principal travelling patronage. That the Petersburg railway receives from the carriage of passengers profits larger in amount, and at a higher rate, than from produce, is not an anomalous fact and confined to that road, but it is in coincidence with the experience on other similar works. Such was the result, contrary to expectation, on the great railway between Manchester and Liverpool, as it is also on that between Philadelphia and New York. In laying down railways with us, this law of their profits should not be lost sight of. The routes should always be chosen with a view to the transit of passengers, that from them, excessive profits being made, as light a toll as possible may be taken for the carriage of produce and merchandize. For it is our great desideratum, in the pursuit of wealth, that our agricultural products should not only be relieved from the enhancement of their value to us, by reason of the greater cost of their transportation, but that as to some of them, our scantiness of crop from an unfavorable soil and climate should be countervailed by a cheaper and quicker carriage to market.

The plan devised by the general convention does not admit in our view of any improvement in its outline. Its details might be changed so as to obviate objections that have been made to them. According to this plan two routes of transport from north to south, are proposed, the first partly by canals and partly by railway across the eastern part of the state, and the other passing through the centre of the state. These lines are to be intersected by a railway, from the head of the western waters, in this state, to tide water. The calculations for the cost of these improvements made under the sanction of the convention are doubtless correct, and can be shown to be so if any are hardy enough to impeach them. The sums to be raised for the purpose were also shown by the convention to be entirely within our means, nay to be a very light undertaking for the state.

It only remains on this part of the subject to say, that the experiment may be made at very inconsiderable risk. Let a railway be extended to Fayetteville, or to our southern boundary from the head of the Petersburg railway, and let it also be connected with the Norfolk railway, so as to embrace the transportation of the United States mail and all the travelling on the centre routes of post coaches and such part of that on the routes east and west of the centre as will be invited to it from its superior accommodations, safety and speed. Let it also be understood, if this road succeed, that a general plan of inland transport is to be gradually but speedily adopted, equal to the wants of the whole state so as to allay local jealousies. A railway in connexion with those from Petersburg and Norfolk will without doubt, not only repay itself, but will afford a large surplus to be expended on other improvements. When these roads from Petersburg and Norfolk, to the Roanoke, are extended to Fayetteville, from the success or failure of the experiment, every man will be able to see and judge in what degree the state is capable of a system of improved transport. If this first attempt be successful, the general plan may be gradually executed in the same cautious method, by successively completing such portions of the general plan or of the particular works, as promise to be most pro-

fitable. Nor do we whose interests are in common with yours, wish to make any public work that will not pay for itself with interest. It is in our opinion, no bad test of the utility of a work that its tolls will replace the expenditure made on it, with interest. It is certainly advisable that the tolls should never be raised much beyond what is necessary for this purpose, as they will be (if too high) and inconvenient and probably a very unequal tax on the industry of the citizen. If any work be a useful one, besides the profits from the tolls, there will be according to all experience a great increase of the wealth of the state, by the enhanced value that will be given to all real property in and near the route of the road or canal.

It is not easy, if we had space for it, to anticipate what would be the result of such a plan of internal improvements as has been proposed by the convention, executed according to our suggestions. Not only would our cotton be relieved from the cost added to its production, by the present inconvenient and expensive mode of transport, but we should be enabled to divert the labor of the middle and western counties, to the culture of bread stuffs, for which none of our competitors in any of the states have a more favorable climate; and if our soil should be improved by a judicious husbandry, we have nothing to fear on this branch of our industry from any competition. A great many articles, the culture of which does not enter into our rural economy, would be found to yield great profit, when they could be sent in a short time and by a cheap conveyance to market. Nor is this all, it seems to us that one of the greatest of the improvements to be expected from the application of steam to the drawing of great weights upon a railway is, that it will alter the location of large towns and cities. Heretofore they have grown up upon the sea coast, or on large rivers, where the heavy articles necessary for building houses and for fuel and provisions for their dense population, might be brought by water carriage: as might also the bulky raw materials on which the industry of their artisans might find employment, and from whence by the same means, the product of their labor could be easily sent to their customers. Now when from 50 to 200 tons can be drawn on a railway, at the rate of 10 or 15 miles in an hour, by this new application of steam power, the location of cities will not depend altogether on their proximity of the sea or a river, and assuredly large inland towns may and will spring up in rich agricultural districts remote from the ocean and the great rivers. In fact, in England, the large manufacturing towns of Manchester, Leeds, Bolton, Birmingham, Sheffield and Preston are inland, and they are supplied with all things necessary for building, for fuel, for provisions and for the processes in the arts and with a vent for their fabrics of the loom and anvil by artificial canals and latterly by rail roads. This seems to us to meet one of our great wants. If considerable towns can be built up in the interior of our state on the routes of canals and railways, the effect on our wealth will equal any sober calculation.

But desirable as these results to our wealth may be, they are very light in comparison of what the improvement of our transport is designed to have and must have on our social and political condition. Wealth is principally desirable, not for itself, but for what may be effected by it, and the history of

our race will show, that without exception, no people have ever been distinguished for refinement—for eminence in the arts—for knowledge and science and for a pure state of morals, without a considerable portion of wealth. An indigent people are always barbarous and savage; they may excel in the destructive art of war, but they are not capable of adding any thing to the enjoyments of peace. We desire, therefore, wealth for our fellow-citizens, that they may be an intellectual and moral people, abounding in all the necessities and luxuries of life, and adding their share to the arts that improve and adorn it. It is obvious that this will be the effect of increased wealth by allowing classes of men among us to devote themselves exclusively to the fine arts, to literature and science, and by the endowment of schools and colleges for the promotion of sound learning. And what is of essential necessity to the existence and perfection of our free institutions, we shall be able, by a system of general instruction at the public expense, to have the children of the poorer classes, which must continue to exist in every community, properly educated; not according to the meagre scheme of common schools, in the mere elements of learning only, but with these they can be well informed on the subject of their civil and political rights and duties, and what is to them and to their fellow-citizens of paramount importance, they can be thoroughly taught in the useful arts and in domestic economy, whereby they can enter on life with such knowledge, skill and habits as will put within their power comfort and independence and usefulness and respectability.

Nor is it to be overlooked in the recommendation of a plan of improvement for the rapid transit of persons, that it will, of itself, have a mighty influence in producing an interchange of facts, opinions and intelligence among men. Our towns and wealthy communities and our remote and poorer districts will be as it were brought nearer together by the increased ease and quickness with which distance may be traversed. An exchange of ideas will be thus brought about, by which knowledge will be imparted and errors and prejudices removed and this secondary effect of improved ways will be of greater consequence than its immediate and primary one, as intellectual are preferable to material riches. It has been well said somewhere, that the application of steam to land and water carriage, has realized the poet's conception of annihilating time and space.

There is a peculiar political advantage which internal improvement holds forth to the people of North Carolina. At present their only bond of union is that of a common country and common laws; they have, as it has been elsewhere remarked, no business in common, and no knowledge of each other. One section of the state has all its trade with Tennessee, another with Georgia, a third with South Carolina and a fourth with Virginia. The projects for improvement, recommended to you by the convention, if carried into effect, will link us together by interest and affection as well as by law.

And now to bring to a conclusion an address, which a desire to advance your welfare has drawn out to a length far beyond what was intended, permit us to say with frankness, but in the most kindly spirit, that the depression of our industry, and our want of political influence, our misfortunes

as we may well call them, have received their keenest edge from the consideration that they are in part the necessary, the bitter consequences of a supine and narrow legislation. As a people, we have literally taken no thought for ourselves, what we should eat or what we should put on. We have left the state to grow like the lily of the field, and verily it is not arrayed like Solomon in all his glory. Let us, fellow countrymen, change this wretched policy which has bound us down to poverty, or sent us exiles from our native land, to seek in the wilds of the west that provision for our own wants, and establishment for our children which was denied to our industry at home. The power to redress your grievances lies entirely with yourselves. Assemble in your respective counties and demand of your representatives, to whom you commit the fate of yourselves and children, that they will adopt some scheme of improvement commensurate with the wants of the state, and that they will begin some public work of such magnitude, that on its completion we may know from an actual experiment whether the state can be improved. If such pledge be taken generally in the counties, we shall at last have some legislative action on internal improvements, and it seems pretty certain from the proceedings of the last assembly, that we shall not till then.

Your destinies, under providence, are in your own hands, and now you are at a most important crisis; throughout the civilized world, and in our own Union particularly, the wealth and talent of every community are turned towards the full development of their physical and moral resources, and if you stand back from the glorious contest, the loss and the shame will be on you and your children. But we hope better things of you; every where among us, the minds of all who love their country, are turned with eager expectation to a general and united effort towards the improvement of the state, and we will not anticipate their disappointment. We will hope from your public spirit, that our legislation at your command shall be changed, and that the state will shake of her lethargy and rise to that wealth and political power which her territory and population place within her reach.

DUNCAN CAMERON, *Chairman*.
 GEORGE E. BADGER,
 DANIEL L. BARRINGER,
 WILLIAM BOYLAN,
 WILLIAM H. HAYWOOD, JR.
 CHARLES L. HINTON,
 GAVIN HOGG,
 JAMES IREDELL,
 ALFRED JONES,
 HENRY SEAWELL.

ERGOT, OR SPURRED RYE.

Rye is liable to be diseased by an insect depositing its animalcula in the grain, which causes it to sprout and produce an excrescence like a cock's spur, of a hard texture. When ground down with the flour, or used in distillation, it proves a mortal poison, and at times has proved a pestilential scourge of Europe. It has been equally fatal in America, and is supposed to have been the chief cause of the plague in London. In 1811 and 1812, a great number of lives were lost from the spurred rye being used as food, and liquor distilled from

the rye. The great mortality was chiefly confined to New York and Vermont. Upwards of twenty thousand victims fell a sacrifice to the ravages produced by that dreadful poison. Meeting after meeting of the faculty took place, to endeavor to discover the cause; and after the most mature deliberation, it was discovered by Dr. Hosack and his party, that it was a poisonous miasma floating in the air, confined to certain prescribed limits, and affecting certain persons, more particularly those that were in the habit of drinking gin: the best apology for their ignorance of the true cause, the ergot or spurred rye. What made their report the more ridiculous was, that there was at that time a fine, clear, black, hard frost, and the healthiest weather that could be imagined. Many of the members were sceptical, and could not believe the report; they thought that owing to the fine weather it was impossible for the contagion to exist in the air; others were of the same opinion with the doctors. One of the non-contagionists wrote and requested me to go to Albany, where the disorder was then raging, and wishing me to endeavor to discover the cause of the afflicting calamity. On my journey from New York to Albany, where the legislature of the state was sitting, I stopped at a place called Kinderhook; and being cold, contrary to my usual practice, I drank a glass of gin: I had not drunk it many minutes before it affected me as if I had taken something boiling hot in my stomach. Although I immediately took an emetic, which produced the most active effects, the poison had taken so firm a hold of my constitution, that my throat and rectum were extremely painful. I had a cold perspiration towards the morning, with a pain in my bones and head, whereas I was in perfect health before I drank the gin. I accused the tavern keeper, of putting poison in the gin: a gentleman of the town who heard me, and had observed that the habitual gin drinkers in the place had died, seconded me in my charge. The landlord declared he was innocent, and referred us to the distillery. Upon our applying, the distiller was much alarmed at our charge of his putting poison in the gin; and added, it would be his ruin if the report got abroad, in consequence of the great mortality. He took a voluntary oath that he put nothing but the pure grain into his gin, and invited us to see the grain in the still house loft. We found it on inspection badly cleaned, and probably one-tenth of it spurred rye, or rye vitiated by being infused with the clavus or ergot. I was quite astonished when I saw it, particularly as it was so well described by Dr. Darwin, as being a pestilential scourge in various parts of Europe, producing what is called by Dr. Mason Good, in his history of medicine, mildew mortification: in America it was vulgarly called dry rot. On dissection I have observed that the windpipe and rectum were so completely parched by the action of the air stimulating or attracting the effects of the poison to the parts, that when pressed they would give way, and appear like black snuff. I lost no time in repairing to Albany. On my arrival the inhabitants were in mourning, on account of the loss of their relatives and friends, some of whom had risen in health in the morning, had eaten a hearty breakfast, and at noon were in eternity! Such was the rapid effects of that inflammation, which was ascribed by the doctors of New York to the air of Albany being charged with the damps of death.

The members of the assembly of the state had at the time under their consideration, a resolution to enable them to remove the state legislature from Albany; it was expected that the resolution would be carried the same night, to the great and irreparable injury of the inhabitants. To the friend who was waiting for me at the hotel, I communicated the glad tidings of having discovered the cause of the disorder. He immediately ran to the assembly-room, and obtained the members' consent to adjourn the question until the following morning. The tavern where I was, was soon crowded by the members and citizens, all anxious to know the cause. It was no sooner communicated, with a detail of my own sufferings, than the members searched the book shops and libraries, and found to their great satisfaction that the ergot was capable of committing ravages upon mankind that I had represented to them. One of the sceptical of the faculty, on being requested to analyze the article, and report on the subject, took a few of his acquaintances some distance into the country, to dine at his father's farm, where an opportunity offered to prove whether the ergot was injurious or not; for a large quantity of it that had been separated from the rye was given to the pigs; and from its fatal effects (as it caused their death the next day) the father became a convert to the opinion. A number of rats, cats, and dogs, also fell sacrifices to its effects, before the sceptical were convinced. — *Whitewell on the Causes of Inflammation, &c.*

CULTIVATION OF LOW GROUNDS.

To the Editor of the Farmers' Register..

I feel it a duty incumbent on me (as every person that wishes to see agriculture flourish ought,) to contribute my mite, be it ever so small, towards sustaining a work so valuable as the Farmers' Register, which I have not the least hesitation in saying, in my humble opinion, is one of the most valuable publications that has ever been offered to the public, at least to the farming community. It is a work that should be in the possession of every farmer who can afford to expend five dollars per annum, towards purchasing an agricultural paper. I have read the Farmers' Register regularly, and can say, that I have acquired much valuable and useful information therefrom. Under these considerations, I have concluded to give you, in my lame and imperfect manner, my experience in cultivating low grounds, which probably may be of advantage to some of your subscribers, who have had still less experience than I have. When I commenced farming, after having the land well ditched and grubbed, I had my low grounds thrown into six feet beds, in the fall, with large turning (or mould-board) ploughs; in the spring just before I commenced planting corn I had the beds reversed, which put the land in very good order for planting. The rows were then opened on the middle of the beds, with common trowel hoe ploughs, and the corn was planted with the hills about two feet apart. My memory does not serve me well enough to state precisely, in what manner the land was cultivated, but I recollect I made a very good crop of corn. It was remarked by two of my oldest and most respectable neighbors, that it was the best corn they had seen grow on that land for several years. But when I came to sow wheat, I found that that plan of cultivating low

grounds would not answer to prepare for that crop; I should have too many water furrows—so many indeed as to occupy one-fourth of the surface. After a little consideration I concluded to throw two beds together, making them twelve feet wide. I sowed my wheat on the twelve feet beds, dragged it in with a large iron tooth drag, had the water furrows well opened, and cross furrows, or grips, opened across the beds wherever there was a low place, that the water furrows could not drain; but having to make the middle of the beds in the old furrows, it caused the beds to be too low in the middle, and to hold water, and consequently injured the wheat so much, that I made a short crop.

Now comes my second year. I now intend giving you my whole process of cultivation. After having the land well ditched and grubbed as before, I fallow my land in the fall, or winter, with large turning ploughs, into twelve feet beds, and re-fallow just before I commence planting corn, if I have time; if not, I run a large iron tooth drag over the beds, which kills most of the young grass. I now open the rows with trowel hoe ploughs, two rows on a bed. It will be well enough to mention here, that I commence planting my low grounds about a fortnight after having finished my high land, so as to give me an opportunity of working over my high land before my low ground becomes very grassy. As soon as I finish working over my high land, I commence in the low ground with small turning ploughs, and run one furrow on each side of the corn, throwing the earth from it; if the land is very grassy, I run two furrows on each side, making four furrows to the row. I now follow on after the ploughs with the hoes, and weed the corn nicely, not putting any earth to it, unless it is likely to fall down. In about five or six days after weeding, I plough my corn again with trowel hoe ploughs, with small boards nailed to the side of the helve of the hoe, to throw a little earth among the corn, to cover the young grass, if there should be any. The third ploughing is done with small turning ploughs, throwing the earth to the corn, so as to strengthen and fortify it against the winds and overflows of the swamp. I plough very deep when finishing the furrow rows, so as to obtain deep water furrows, to carry off the water as quick as possible, in case of an overflow; in the mean time taking care to plough very shallow when finishing the rows on the middle of the beds, to avoid making deep furrows, as I shall have to make the middle of the beds, when I fallow for wheat, in those furrows, which if they were deep, would cause the wheat beds to be low in the middle, and hold water, as I have before stated. The fourth and last ploughing is done precisely in the same manner as the third, and followed with the hoe hands to cut down the weeds and adjust the earth around the corn.

As soon as the corn is ripe enough to be taken off of the land, I commence fallowing the land for wheat, with large turning ploughs, into twelve feet beds, making the middle of the bed in the shallow furrows, by which means the middle of them are higher than any other part; I now sow my wheat, about one bushel to the acre, and drag it in with a large iron tooth drag. After dragging I have all the water furrows well opened with large turning ploughs, and at the ends where they empty into a ditch or the main stream, I have

them opened with hoes or spades; and if there should be any low places in the land, I have cross furrows or grips cut across the beds, as before mentioned, to the lowest point, by which means such places are kept perfectly dry. I have pursued the last mentioned plan of cultivating low ground for three years, and have succeeded very well with both corn and wheat in every instance.

In conclusion, I beg you to accept of my most cordial and sincere wishes, for the success of the noble and valuable work, which you have the honor of being editor.

ADOLESCENS.

Prince George.

DISEASES OF SHEEP AND COWS.

For the Farmers' Register.

Essex county, May 24th, 1834.

Sheep and cattle like the human family, are subject to a variety of diseases: but it is not my intention to notice more than one or two. There is a disease to which sheep are subject, that is probably more destructive to them than is generally supposed—that of the worm in the head. I have not unfrequently had sheep that were fat, that looked healthy and well, to sicken and die in the course of a few days; and under the impression that they had eaten something poisonous, such things were given them as are generally recommended in books for poison, but with no advantage. Having purchased some Bakewell and Southdown sheep at from \$20 to \$30 each, has probably induced me to pay rather more attention to my sheep than otherwise I should. One very cold day, winter before last, I saw a half Bakewell ewe standing in the snow about fifty yards from a shelter that had been erected for my sheep, and under which they had usually slept. Her head was down, and occasionally she moved a little. Supposing that she had a young lamb, I walked that course with a view of having the lamb moved to the shelter; but as I approached her, she did not appear to observe me. I took hold of her and she appeared too stupid to notice it. Her head was inclined a little to one side, her eyes glared and appeared almost fixed in their orbits. She was found too stupid to be driven to the fold, and had to be carried. She lived several days; at first she had slight spasms, and foamed a little at the mouth, but after a day or two, she was more strongly convulsed, and would fall down, but would again get up. Supposing her head to be the seat of the disease, after her death it was dissected, and a worm was found in one of the nostrils, a little below the eye, about an inch in length and a quarter of an inch in thickness. Supposing that one alone had killed her, very little examination further was made. In January last, two sheep on the same morning appeared to be sick, one a ewe of the common breed, in fine order, the other a half Bakewell ewe, and fat. The common ewe held her head as high or higher than usual, with it a little inclined to one side, the eyes resembled those of the one already described: on approaching her, she appeared a little stupid, would suffer me to approach very near, and then suddenly dart off as if she had just perceived me. The other held her head rather lower than usual, and suffered me to approach her rather nearer than the other, and appeared more stupid and sick, with no glaring of the eyes. Next day both of them

were evidently worse, and the common ewe disposed to hang her head; and on the third day she laid down to get up no more. The glare of the eyes continued, the pupil became enlarged, spasms came on, and a little foam was observed about the mouth. The spasm was first observed to throw the left ear in motion, then the left eye lid, quickly after which it appeared all over the face, head, and neck, but as she was lying down the force of the spasm upon the body, could not be seen as upon the one the winter before. The morning she died, I was about leaving home when I was informed she was dead; but I requested her head to be examined to see if any worm could be found. On my return a worm was brought me, about the size of the one already described, and it was stated it was taken out of the head between the eyes. I think it not improbable there might have been many more. The half Bakewell appeared more stupid and sick every day, and held her head lower and lower, until her nose almost rested on the ground as she stood up. I saw her but a few times after the death of the other, but I think towards the last, the symptoms were very much like the other two. About a day and a half after the death of the other, I was informed the half Bakewell was dying. As night was fast coming on, and the weather was extremely cold, it was thought best to have the sheep killed and skinned while warm, after which the body was examined, but nothing found amiss. It was getting too dark to dissect the head, and that was laid by for morning. In dissecting, it was found filled with blood, having been knocked on the head with an axe to kill it. Under this disadvantage it was dissected, and from the head was taken nineteen worms. Some were found high up the nostrils, some in the different cavities of the head, and one large one was found lying on the thin membrane that envelopes the brain; they were of all lengths, from a quarter of an inch to an inch. They were placed upon a piece of paper, and none appeared to be alive: but afterwards, while looking at them by the fire, many were found to move. It appears strange that so many should have been found in the head of one sheep, and that one quite fit. Whether it was their particular location, or like the grubs in the horse, they remain for a time peaceable and inoffensive, and then suddenly destroy life, I must leave for the reflection of others. The worm is supposed to be the produce of a fly which deposits its eggs a little within the margin of the nose, to avoid which is the cause why sheep gather together, and turn their noses inwards. Daubing the nose often with tar or train oil is said to be a preventive. About a table spoonful of a decoction of Scotch snuff injected up each nostril with a syringe, three or four times from the 1st of October to the 1st of January, is said to be a good remedy, but is apt to make the sheep very drunk for a short time. I cannot say I have much confidence in either the preventive or remedy proving effectual.

I will now notice one disease to which the cow is subject, that of an inflammation of the udder. I have frequently heard it stated, that it is produced from the snake sucking the cow. The snake is supposed to be fond of milk, but as to any familiarity between the snake and the cow, I have never believed in it. The snake is more like Ishmael of old, whose hand was "against every man,

and every man's hand against him." This disease is not very uncommon to cows. A few years past one of the finest cows upon my farm (a half Durham) became diseased in one quarter of her udder, and not knowing at that time the cause or remedy, that quarter gradually perished away, and has never since produced milk. To show the cause, the symptoms, and cure of this disease, I will make an extract from a treatise on stock, which was published in England, by J. B. Lawrence, and which has recently been republished in this country.

"Downfall, udder-ill, inflammation of the udder, &c.—From what we have said of the digestive process of the cow, and the intimate connection between the fourth stomach and the udder, the reader will be at no loss to understand that when that is out of order, the udder, and consequently the quality and quantity of the milk, must be materially affected. These, or rather this complaint, for they are all one, or different stages of the same disease, of which the predisposing cause was bad feeding, and the exciting cause, a cold or inflammation of the udder, is essential to be taken in time, and of the utmost consequence to the owners of young cattle, which are very liable to its attack, especially at the time of calving."

"Cause.—This disease may not only proceed from the above causes, but may also be induced by the animal drinking freely of cold water, when heated by exercise, or by cold exposure and lying down in cold and damp grass at the latter end of the year, when the nights are cold and foggy, and at a time when the stomach is loaded with food, and the blood plentiful."

"Symptoms.—One or more quarters of the udder becomes swollen, hardened, hotter than common, and painful when pressed; the milk is reduced in quantity, and changed to a ragged, or bloody, or corrupt appearance. At other times, the secretion of milk is stopped, and the tumefied quarter proceeds to a state of suppuration."

"Cure.—As soon as the disease is discovered, remove the animal from the pasture, and take from her from three to five quarts of blood; especially if the cow be in good condition, and breathes quickly, and appears stupid." "If the weather be damp and cold, keep her under shelter, and feed her moderately with nourishing food; but if the weather be fine, turn her into a bare pasture, where she will be obliged to exert herself for her food. The swollen udder, or rather that part of it which is affected (for there is seldom more than one part of quarter affected at a time) should have the bad milk drawn from it three or four times a day; for if suffered to remain in it, it will irritate and increase the inflammation. Bathe it also after milking with olive oil, or elder ointment."

The same writer recommends medicine to be given internally. His doses are compounds, and the ingredients are not generally kept by farmers, but as epsom salts enter largely into some of them, I imagine they would answer alone. My own impression is, that the best care would be, to let the calf run with the mother during the continuance of the inflammation, provided, it would suck all the teats.

Extract from the same writer.

"Sore teats.—Some cows are very subject to sore teats, particularly such as have newly calved; if

this be the case in summer, they often become ulcerated, and the flies plague them to a degree which renders them extremely difficult to milk: it is also a great nuisance at the time of milking, as blood and corrupt matter are apt to pass between the fingers into the milk. The following liniment is very useful for anointing sore teats, and should always be kept in readiness for use:

Ointment of elder four ounces, yellow basilicon ointment four ounces, spirits of turpentine one ounce, mix and well incorporate them together on a slab, and it is fit for use.

With this ointment you may well rub the cows teats every night and morning after milking, if in the summer assafoetida or aloes in powder, and dissolve it along with the ointment. This will prevent the flies from teasing the animal. If the teats be tender only, and not sore, a little gentle rubbing with weak salt and water will in general be sufficient." Finding it inconvenient to prepare the ointment exactly as directed in the foregoing receipt, a handful of the inner bark of the elder was taken and simmered in hogs lard. Six ounces of the elder ointment was then taken and while it was warm, one ounce of bees wax and one ounce of turpentine were added, and melted together. After being stirred awhile, the turpentine mostly sunk to the bottom and was thrown out: one ounce of spirits of turpentine was then added, and the whole stirred as long as it was in a liquid state. After the ointment was made, a little boy that had fallen to sleep in the room was waked up to go to bed, he was found unable to walk without assistance, in consequence of his feet being so much chopped and inflamed; they were rubbed with the ointment, and by the morning there was no appearance of inflammation, and the skin was soft and supple and they soon got well. Though this ointment is not prepared in the way directed, the same ingredients are used and almost exactly in the same proportions. It is an excellent ointment for man or beast, and should be kept in every family.

EDMUND F. NOEL.

COTTON SEED OIL.

From the Petersburg Intelligencer.

Our enterprising fellow-citizen, Jabez Smith, Esq. has succeeded in bringing to perfection the manufacture of cotton seed oil for the use of lamps. After a fair trial, we have given it the preference over any sperm oil we have seen for many years. It burns with a beautiful and clear light, without smoke and entirely free from any offensive smell. We congratulate the southern country on the successful effort which has thus been made to give increased value to one of its staple products. The time is not far distant, when the oil from cotton seed, entering as it will into competition with sperm and linseed oil in the various uses to which they are applied, will become an important item in the exports of the southern and south-western states.

When the experiment was first made, to burn this oil in lamps, an opinion was entertained by some, that the glutinous matter could never be sufficiently extracted to answer so desirable a purpose. The recent improvements of Mr. Smith have removed every doubt upon that subject; and he now offers to the public an oil, which is unsurpassed by any other article of that description.

CUTTING CORN STALKS.

From the Northern Farmer.

Among the most irrational practices in agricultural pursuits, is that of cutting the stalks, or "topping the corn," as it is often called, before the ears of corn are fully ripe. It is difficult to count for the origin of the practice. It never was adopted in England, for maize or Indian corn never was cultivated in that country. It is possible that in the early settlement of this country, some began to cut the green stalks to feed cattle, and the injury to the corn not being perceptible, the practice, by degrees became extensive. At the present day, farmers consider it as a mark of bad husbandry, when the corn fields are not topped early, or in good season. But regardless of such prejudices I have not topped my corn for several years; and I furthermore say, that I will never consent to have my corn stalks cut, until the corn has come to maturity, or is ready to harvest. I do not know of even a single beneficial purpose, which can be gained by adopting the common practice; and verily believe that, at no distant day, farmers, generally, will condemn the present practice, and feel surprised at the stupid folly which formerly countenanced it.

In February 1832, I published a few remarks on this important subject, in the New England Farmer. Other agriculturists had devoted some attention to it. Since that time, some fair experiments have been made, proving conclusively that the present practice is attended with an unnecessary loss of labor, and a very great injury to the corn crops. We advert to the experiment of Wm. Clark, jr. of Northampton, stated in the Northern Farmer of July 7, 1832, by which it appears that the average loss, by cutting the stalks, exceeds *twelve bushels* per-acre; and also that the corn weighs less by one pound per bushel. We will add that the corn by shrivelling and shrinking, in consequence of mutilating the stalk, will be less valuable in respect to its flavor.

The agriculturist should study the operations of nature. He will find these unerring and right. Science enlarges our conceptions and exalts our admiration of the works of the Creator, and proclaims, at every step, as we advance our researches into the vegetable as well as the animal kingdom, that "in wisdom He hath formed" the whole. The organic structure of every plant or vegetable is perfect.

The beautiful foliage of trees, and the broad blades or leaves of the corn are as necessary to their growth and existence as are the lungs to the human body. The green leaves emit oxygen, or the vital part of the air, and absorb that part, which is injurious to the human health, on respiration. If we attentively examine each part of the growing corn, we discover that each part performs its natural function, all tending to advance the ear to maturity. The farina, which falls from the top at the appointed season in copious effusion upon the green silk or tassels, impregnates each kernel of the ear through the medium of the silk, one thread of which is attached to each kernel. But the stalk above, as well as below the ears contains a saccharine juice, which gently oozes into the cob, and from the cob into the kernel, and this operation does not cease until the kernel is fully ripe. It is not ripe until its inner part be-

comes rather hard, or is "out of the milk," as farmers say.

The corn plant derives nutriment from the atmospheric air as well as the soil. By depriving it of its top and a portion of its blades, we cut off one source at least of its natural aliment. Such an unnatural practice arrests the natural circulation of the sap, which flows through the stalk. Some farmers may, perhaps believe, that by so doing, they can turn or force the juices into the ear in a mode more wisely than that already provided by the Author of nature!

It surely cannot require any great developement of the principles which govern vegetation, to convince the enlightened, that the common practice of cutting off the corn stalks near the middle, while the corn is in the milk, and while nature is making her efforts to bring it to maturity, must necessarily be attended with the injurious consequences, which fair experiments have clearly demonstrated.

But is the corn plant the only vegetable which will flourish better under the operation of the dissecting knife? Try it upon the green potato vine, immediately after the potato has attained its full size. Strip the foliage from fruit trees, so soon as the fruit is fully grown. Try the experiment from a great variety of vegetables. The effect would not be doubtful. Let the farmer enquire, why the corn plant should stand in the field as a solitary exception to other vegetables?

Some farmers think that topping the corn expedites its ripening, and gives a greater quantity of fodder for cattle. But it is fully ascertained that it will ripen sooner without cutting the stalks; and the tops and spreading blades furnish a partial protection against early frosts. This is admitted by some intelligent farmers, who still approve of "topping." But it seems to us, that this admission in accordance with the fact, tends to support the position we have advanced.

The stalks, if cut green and dried, containing the saccharine juice provided by nature for the ear, may be sweeter; but would they not weigh more, had they been cut after the corn is fit for harvesting? But it is certain, that the whole stalks cut up at once, near the ground, after the corn is fit to gather, will afford a greater quantity of fodder, the under stalks being much heavier than the tops. The "butts" are generally left and wasted in the field. Any portion of these, which the cattle will not eat, ought to be converted into manure. If the cattle have a keener appetite for stalks cut when green, we know that they also very greedily consume those cut at harvest time.

If topping did not injure the corn, there cannot, therefore, be any gain by pursuing the present practice. But this practice is attended by useless labor.

Some have recommended to cut up the corn, when ripe, close to the ground, tie it in small bundles, and set it up in small stacks by the side of the corn field to dry, and afterwards to convey it to the barn to husk. But we think that in favorable seasons, when the standing corn is well dried, or fit for harvesting, it may be more judicious to cut up the corn close to the ground, convey a few loads daily to the barn, spread it well upon the floor, husk it immediately, and put it into a granary made for the purpose, standing on posts about three feet from the ground, properly ventilated. For several years this has been our practice.

Another practice, among farmers, is very censurable. They often pile up their corn in the barn in large heaps in order to have what are called "huskings." In these heaps there are often green materials, green stalks, green ears, and foul matter, which after laying a short time, produce a state of fermentation, the whole heap becomes warm, and tainted with the noxious gases or effluvia which penetrate every part. The corn is finally husked, and often placed in rooms not well ventilated. The corn may be sound and look finely—the bread palatable, perhaps called good. But the question, whether it might not have been rendered *far better and sweeter* with proper management, seldom, perhaps, enters the farmer's mind.

W. CLAGGETT.

Portsmouth, March 12, 1834.

REMARKS ON GATHERING FODDER IN VIRGINIA.

Several selected articles on the cutting of corn tops have at different times been presented to the readers of the Farmers' Register, with the hope that some persons would thereby be induced to give the fruits of their observation and experience, on the same subject. But as this has not yet been done, we will attempt more pointedly to invite attention to what is in Virginia, a far more important business than in New England, and which, if wrong, must be attended with annual losses, of incalculable amount.

The evils spoken of by Mr. Claggett in the foregoing communication, are attributed merely to the cutting off the tops of corn—as northern farmers, seldom, if ever, strip off the blades below the ears. In Virginia, we invariably do both; as few make any hay, and all rely principally on the corn blades for long forage for their horses. It is true, that every one admits that the tops and blades should not be removed until the "corn is forward enough to bear it:" but there is no one who does not every year violate this rule, in a vast number of cases, even in his own judgement—and perhaps in ten times as many, if the truth was clearly understood. No experiment has yet been made to try whether any, or what amount of injury is caused by depriving a green stalk of corn of its leaves and top: but it seems not improbable, as the process is usually conducted, that the loss of grain is more than equal to the whole net profit on the fodder.

No experiment, however, would be required by any one acquainted with the laws of vegetation, to be satisfied that while the plant remains green, it must still be furnishing something to the unripe grain. When all the grain is perfectly made, the leaves and tops have completed their intended functions, and they wither and die very soon afterwards. If in the short interval between the perfect maturity of the grain, and the drying of the blades, the latter could be gathered, it may be admitted that no harm would be done: but the fodder would already have been greatly injured by age, and the gathering would be troublesome from the irregularity of the ripening.

But without contending for the full extent of this position, let us test our practice by our generally prevailing opinions; and by that test, our practice will be found to be wasteful and injudicious. It is generally

considered that when the outer part of the grain is hard, and shows the indenture that the large southern corn is marked with, the fodder may be gathered safely. The arrival of that time is anxiously watched for by industrious farmers, and "pushing overseers," not only to save the crop of fodder in the best condition, but because there is then no regular crop work on hand, and regular employment is desirable for the laboring force. The ripening of corn, of course, is irregular in every field, from the many replanted stalks, and from various other causes. If the operation was put off until every stalk was considered ready for it, the greater part of the blades would be dry and worthless—and therefore the time is chosen when the great majority of the plants have just reached (what is said to be) the safe and proper state. The laborers may be directed to pass by the immature plants: but they very rarely have care or judgement to do this; and every ear on such plants, is more or less damaged by the operation. For whether the plants are green or ripe, the stripping off all the leaves serves to kill them immediately. Whenever it is safe to deprive the corn of all its leaves, it is as safe to cut off the whole plant, as is done sometimes at the north.

If any one denies the damage caused more or less to every crop of corn by pulling fodder too early, let him now visit his corn-crib, and see what a large proportion of ears have shrivelled grains, standing separate and loose on the cob. Every ear of this kind which had been planted not very late, nor on land too poor to perfect the plant, owes its deficiency to the fodder gathering. In some seasons, the leaves dry much sooner than others, compared to the hardening of the grain—and in those years, lest the fodders should be totally lost, unusual damage is caused to the grain. This was the case in 1832. Though the pulling of fodder was begun unusually late, and after it had lost much by being dried on the stalks, still the grain was generally too soft. When the corn was beaten out for sale, in the following spring, it was found very difficult to separate the grain from the cob: and the grain was of inferior quality, from some (at least) of the lightest and warmest, as well as richest soils, on the lower James river. As even the earliest frost, in such situations, must give full time for Indian corn to be matured, these effects could only have been caused by the life of the plants having been destroyed, and the maturity of the grain prevented, by the too early gathering the fodder.

It is hoped that careful and fair experiments may be made the next season so as to leave less of doubt on this subject—or to awaken doubts in those who may be pursuing a wrong course, without a suspicion of loss therefrom.

BONE MANURE.

Mr. Watson, a distinguished agriculturist of Perthshire, put 25 bushels per acre of bone dust on two Scotch acres, 25 cart-loads of barn manure on each of two more acres. The acres with bone manure produced 28 tons of turnips, and the other 22 tons.

MARSH MUD AS MANURE.

To the Editor of the Farmers' Register.

Queen Ann's county, Eastern Shore of Md.

To a query in your last "Register" in relation to marsh mud, I answer, that I have for several years used marsh mud with great success. My estate lies on a salt-water river, and marsh mud has never failed in any application I have made of it. I prefer it from small inlets which make from the river into my fields, which have been long in cultivation, as it is improved by the deposit from the uplands; but I find it very valuable from the salt marsh, where it has had no such improvement. Wheat, Indian corn, oats, and clover grow kindly from its effects, and I deem it more valuable than barn yard manure.

I would recommend to your correspondent to begin with a small experiment, as it has not uniformly in this county answered expectations. A friend of mine, who resides on Chester river, some years ago carried out a large quantity, from which he derived but little benefit, and for which, I have been unable to account, unless it be that the waters of the Wye, (where I reside) are much saltier than those of the Chester.

I have a piece of hilly land, though not broken by gullies, in one of my fields, the cultivation of which had been for many years abandoned, on account of its sterility: the adjacent land by means of marl, I had got into a state of fertility, but this being a cold soil, with much gravel in it, I did not deem it in a state to be improved by marl. In 1831, I covered it with marsh mud, of good quality, about seventy loads to the acre, and put it in wheat in the fall, but the whole of it being covered with sedge, I could not put it in a good state of preparation: I nevertheless reaped a tolerable crop, by estimation from the shocks about ten bushels to the acre. Last year though the season was unfavorable, it produced a good crop of Indian corn. It is now in oats and clover, and promises a fine crop. Though I have plenty of shell marl, for immediate profit, I prefer marsh mud: it is more accessible, its effects are quicker, and much more can be done in the way of improvement for the same money. At the same time I confess, that the permanent advantages of marl are much greater, and I think marl and marsh mud will both be improved by combination. My present project is to cover my fields convenient to the river, with marsh mud, which I have in part effected: should I live to accomplish it, I shall consider my estate improved an hundred per cent.

I am sorry to bear witness that the lands on the Eastern Shore of Maryland, like those of lower Virginia, are greatly impoverished, and that nothing can prevent the depopulation of a country, once fertile and still dear to us, but an improved system of agriculture, in the promotion of which, I think your Register well calculated to contribute.

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OBSERVATIONS ON THE PRESENT CONDITION OF THE SOUTHERN STATES.

From the Southern Agriculturist.

The present crisis in our national affairs is certainly one, which the southern planter must regard with the most painful anxiety. It is one

pregnant with consequence of the greatest importance to the nation at large. A dark and threatening cloud hangs over our land, and whether we shall be visited with the whirlwind and the tempest, or whether it shall pass by, and the sunshine of peace and contentment again illumine our prospects, yet remains in the womb of futurity; but it behoves us to be prepared for either event. If it be ordained that the tornado shall sweep over our land, and our fair prospects of wealth and of greatness shall be blasted, we shall not be the worse off, for having contemplated the probability of such an event, and for having endeavoured to avert its fury. Should our fears, however, prove groundless, and the rumbling of the distant thunder cease to agitate our minds, yet shall we be benefited by having been prepared for it. It is not our intention to enter into any discussion on the great question which now agitates and distracts our councils. Our present object is merely to throw out a few hints, which may perchance be of use to some of our planters.

It is a well known fact, that the quantity of cotton already grown is fully equal to the consumption, and by many, it is believed, to exceed it. It is also well known to our planters, that at the present prices, it is far from being a crop, which makes a good return for the capital vested in it. It is, we believe, a losing business to many—we say a losing business, for we consider all such, which does not yield us that interest on our capital, which we could obtain for it in other pursuits. If such be the case, and we think there are few who will deny it, it will require but a small share of discernment to ascertain, that it has become necessary for us to retrench our expenses as far as possible, that we should live as much within our income as it is practicable; and that we should commence a system of frugality and economy, not only on our plantations, but even in our very families; nay, more, it may be necessary in many instances to push this even to extremes. We are aware how much easier it is to lay down rules for our conduct than to practice them; we are aware that it is not an easy task for us after having been accustomed to a certain style of living, to descend to that which we consider inferior, that it is not an easy matter for us to relinquish those luxuries, which, from long indulgence, we have been brought to consider as the very necessities of life.

There is a species of pride which prompts us to imitate the luxuries of the wealthy, and to imitate if not exceed, the style of our neighbors, and this, too, when we very often know that the consequences will be pernicious, if not ruinous; and it very often occurs that the deeper we are involved, the more anxious do we become to conceal it from the world, and the more strenuous to maintain the same showy appearance. We cannot brook the idea that our more wealthy neighbor (who by the by, may be in equally as bad circumstances as ourselves) should look down on us with pity, if not with contempt. We cannot bear the thought that the world should know that we are not as wealthy as it was willing to believe us to be, and thus lose the importance attached to our riches. But surely this is a false pride. Neither the dignity nor the usefulness of a man consists in the extent of his possessions, and it is surely more praiseworthy for him, to exert a small portion of his firmness, and at once check his mad career, than to continue the

deception until it is beyond his power to control his destiny any longer; and certainly we should think it wiser in him to retrench whilst he has it in his power, than to continue his course and reduce himself and his family to the brink of ruin, perhaps, to want, for such must be the final termination unless unforeseen circumstances prevent. Many put off the evil day, and because they have as efficiency to support themselves thus, as long as in all probability they shall live, think not of the future, and finally leave their families in the most abject distress. This is selfish and unmanly, and cannot but be condemned by all, however much we may be inclined to follow in the same track. We have said that we should economize in our families, and live for the present, at least, by the strictest rules of frugality. But having gone thus far, we presume to go no farther, we enter not into the privacy of domestic life, we pretend not to dictate in this matter. What is economy in one, may be prodigality in another. All that we can recommend is, that each should endeavor to his uttermost, so far to retrench his expenses, that his income shall not only be equal to, but even exceed it, so that there may be an excess which may be appropriated either to the extinguishment of old debts, or the purchase of other property.

It is our wish to enter somewhat more fully into the details of the economy of our plantations, and to touch on some few of those sources of expenditure which have for many years past drained us of such large portions of our income. We believe that many of our planters on this score have been both negligent, and wasteful. We believe that much has been expended which might have been saved. We believe that expenses have been incurred which need not have been, had we but justly understood and estimated our own resources. This has not been the case, and we are now reaping our rewards. The evil is not, however, past bearing, nor beyond a remedy. It but requires that we should turn our attention seriously to the subject, and manfully to persist in the execution of our design of reformation. The first step towards this is for us to determine to live as much as possible within our own resources, to purchase nothing for our farms or plantations which we can rear or manufacture at home, thus leaving whatever may arise from the sale of our crops almost untouched. We do not pretend to say that all that is needed on a plantation can be there obtained—we know that this is not the case—we know that in many instances it will be better to purchase, rather than attempt the making at home. But we do say that more than two-thirds of our expenses on our plantations may be saved by a just distribution of the labor of our workmen. And here permit us to introduce two trite sayings, and which it would be for the benefit of our planters to reflect on, somewhat oftener than they do. The first is, "a penny saved is a penny gained," and the other is "take care of the pence and the pounds will take care of themselves."

The first item which we would recommend to the consideration of our planters is, that they should raise on their plantations, at least, as much grain as may be equal to the consumption of the place; let there be rather an excess than a deficiency. During the prevalence of the cotton mania, (for we can call it by no softer name) this was almost altogether neglected, and we depend-

ed in a great degree on importations for our supply of provisions.—Our whole thoughts were given to cotton. This was the theme of every conversation, and every thing else appertaining to agriculture was deemed of two little consequence, to divert in any manner any part of our attention or labor. We became completely infatuated, neglected every thing else and became purchasers of what with the greatest ease might have been produced on our plantations in abundance. During the period when cotton bore such extravagant prices, some plausible reasons might have been assigned, for thus deviating from what appears to us to be the true policy of every planter, but that this state of things should continue after the cause which produced it has ceased, is surely a matter of some surprise. But so it is, although we cannot make use of the same plea in extenuation of our fault. During the period to which we refer, it was said, "that an acre of cotton would purchase the produce of several acres of corn, and therefore it was better to plant all cotton, and purchase whatever corn was necessary for the consumption of the plantation." In some instances this might have been so, but we doubt whether at any time this has been a correct system of management, and we are inclined to think that the whole has been supported by arguments drawn from false data. The principal of which have been:

1st. In overrating the quantity of cotton produced, and the price likely to be obtained, and underrating the corn both as to quantity, and the price we would have to give for it.

2dly. In not considering the difference of work required in working and preparing the product of an acre of cotton for market, and the labor bestowed on an acre of corn, and how much more a laborer could attend of the one than of the other.

3dly. In not apportioning justly the work necessary to be done, to the means we had for accomplishing it, and on this, perhaps, more depends than at first view of the subject appears. Thus it sometimes happens that less is accomplished than might have been, and it is owing to this that we see one planter with the same force performing nearly twice as much as any other.

But it is not our intention to enlarge on these topics. The present low prices of cotton will force us, if it has not already done so, to abandon a system of management, which has for its object the raising of one article alone, with the product of which we are to purchase all other things necessary for us. This is regarded by many as a great calamity, but we confess that we do not view it in this light; it is true, one of the staple articles of our state has been reduced in value; yet, still, we do not see cause for despondency. The resources of the southern states have never yet been fully developed, and we believe that there are many sources of wealth, which are either untried, or but just coming into notice, which may once more restore to us those days of prosperity which now appear to have glided from us for ever. On this subject we intend not now to make any observations, we will confine our remarks to the policy proper to be pursued by our planters as individuals and not as members of a body politic. We intend also to be brief in what we shall say, wishing rather to draw the attention of our planters to the subject, and then leave it to their better judgment, than to enter into any crude details of our own.

We have said, that each planter should depend on his own resources, and rely more on the means which have been placed within his reach, for the supply of such things as may be needed on his place. In this respect, at least, we would wish him to imitate our northern farmers, who usually so manage their affairs as to leave the proceeds of their principal crops untouched for any of the expenses of the farm: and thus would we wish it to be among us here. Let our planters raise their own provisions, their own horses, or mules, their own oxen and their cows, their sheep and their hogs.

An intelligent stranger would, perhaps, be surprised at this list of (we would almost say) indispensables, to every farmer, things without which no farm can be well conducted. Yet, alas, how few are there who do not depend altogether on purchasing every article here enumerated, if we except that of cattle. Yet each and all, can be raised on almost every farm, sufficient for the demand, without materially diverting any of the labor, which might be wanted for other purposes, and is it not a shame to us that these things should be bought instead of being raised at home? And is it not a greater shame to us, that instead of being able to supply one another with the articles wanted, that we are obliged to seek for them abroad—to import corn from the North, and hogs, mules and horses from the West? Thus it is that we have ever been drained. We have been accounted rich, and we have even believed it, but we have been only nominally so. We have received large amounts for our cottons, but it has passed from us for these necessary supplies, and if a true balance sheet was exhibited, on which should be set down all moneys received for cotton, and all expended by us for articles, which were absolutely necessary, the balance in our favor, would, we fear, be but very trifling, compared to what is generally supposed. Thus giving to us the appearance of wealth without the reality, and by this very deception, have we been brought almost to the verge of ruin, by causing a greater carelessness in the management of our affairs, and introducing a more luxurious style of living among us.

We have digressed from our subject and will now return. We confess that we wish to see even more than this accomplished. We wish to see our planters not only raising their own provisions, horses, mules, cattle, &c., but even manufacturing the clothing necessary for their workmen, the bagging necessary for their cotton, and the rope necessary for baling it. We may, perhaps, be deemed visionary for even touching on these subjects, yet we do not hesitate a moment to say, that all can be done, and so done, that we shall gain considerably by it. Moreover, we have not the slightest doubt but that the day is not far distant when it will be done. And can this be done? We say that it can, we are so situated, that there is not an article grown or manufactured, which may be necessary for us to have, excepting, perhaps, a few articles of luxury, but which may be brought to perfection among us. We have all the materials for being a great and independent state, and we lack but the spirit. It is in the power of our planters, to be the most independent agriculturists in the world. We admit that these are broad assertions, but we think that they can be supported both by arguments and facts.

Now what are needed by a planter for his plantation? Provisions and clothes for his negroes; horses or mules for his work; sheep, hogs and cattle, for the general good of the place. That all of these can be produced on his place, we presume no one will pretend to deny, the point to be considered is not the feasibility of the thing, but the expediency of it, not whether we can execute, but whether we shall gain or lose by it; finally, whether it be more economical in us to raise and manufacture these articles for ourselves, and among ourselves, or purchase them. We think it is for our interest to do this among ourselves—we think it will be for the good of the southern states generally if the planters will pursue this plan. We may, perhaps, take up this subject at some future period.

AGRICOLA.

CAUSES OF THE DEPRESSED CONDITION OF LOWER VIRGINIA.

For the Farmers' Register.

* * * * The salt tide region of Virginia possesses such great advantages for farming, and offers so many inducements for the investments of capitalists, that it seems to a stranger not only remarkable, but unaccountable, why agricultural profits and improvements should be generally so low, and the prices of land still more depressed: poor lands, but such as have abundant and cheap means for being enriched, often selling at from \$1 to \$2 the acre—and even such as are already rich, at from \$5 to \$20. Many tracts at such prices are on waters among the best in the world for navigation—and all are convenient to them, and to some one or more of the market towns of the Chesapeake. It is a ready answer, and the one which is usually given and received as conclusive to account for the degradation of this noble farming region, that the unhealthiness of the country prevents its improvement. But this is very far from being true. It is not denied that many particular parts of the low country, are much exposed to the consequences of *malaria*, in autumnal bilious fevers of greater or less violence—and that the inhabitants of the whole region are more subject than those of higher lands, to very mild forms of such diseases—generally intermittent fevers, which seldom last more than a few days, or require the aid of a physician. Much the greater part of all these diseases are attributable to local causes, which the increase of knowledge, and of improvement in farming, will serve hereafter to remove. But even as at present, and without counting on these means of prevention, the tide water region is far from being so unhealthy as is believed by strangers. The ague and fever, and other mild forms of bilious diseases, seem to serve as a safety valve to the human frame, to let off the seeds of all others—and the penalty paid in this manner, however disagreeable it may be, is in a considerable degree an insurance against the violent and fatal inflammatory diseases which are so much more prevalent in what are called healthy regions. It seems indeed that the healthiness or unhealthiness of any place, is usually estimated altogether by the degree of prevalence of autumnal bilious diseases—and if a place is nearly free from these, it is considered healthy, no matter how many may be afflicted, or die, with consumptions, pleurisias, &c. Diseases, except those of bilious

character, and at all seasons except in autumn, are rare in this part of the country; and many situations, and thousands of individuals through their lives, are as free even from these most prevailing diseases, as is usual above the falls of the rivers.

Many causes have concurred to produce and increase the degraded condition of the lower country. But I am disposed to believe that the main cause, (and one all sufficient for the effects,) is that which is our great boast and pride at home, and the continued theme of our praise abroad—"the hospitality of Old Virginia." To this virtue (carried to the excess which converts a virtue to a vice) I ascribe the decline of the finest part of Virginia, and the impoverishment and ruin of thousands of the kindest and warmest hearted people in the world. Such effects are certainly not produced merely by the meat and liquor consumed by friends and visitors; but it is our custom to give up to all visitors not only the best entertainment, but also the time, the employments, and the habits of the host—and this not only for friends, and visitors whose company is pleasing and desirable, but for every individual of the despicable race of loungers and spongers which our custom of universal hospitality has created—*gentlemen* (for they are all so styled,) who spend their lives in feasting at the expense of other people, and who are content to live despised, provided they can live without labor. These spongers are a class peculiar to our region, and who could not exist elsewhere. If any of them were carried by compulsion among the frugal people of the eastern states, or the laborious and enterprising settlers of the West, they would soon starve—or suffer almost as painful an alternative in being compelled to work to earn food and clothing. Would to heaven they could meet the same fate here—for they are the devourers of our fair country, and destroyers of its inhabitants. One hundred of such honorable and gentlemanly vagrants are more fatal to the district they prey upon, than would be periodical visitations of clouds of Asiatic locusts, accompanied by the Asiatic cholera.

The farmer who may be the most disposed to enrich his land, and to make the greatest possible profit from his capital and means, must either come into the general habits of the country, or be considered a niggardly churl; and for this reason, many who would find no pleasure in such a course of life, even if free of cost, submit to travel with their neighbors this broad road to ruin. No retrenchment of expense, no lessening of hospitality, can be endured—poverty and exile are preferable; and when a man's property is nearly expended, he sells his land for less than the dwelling house on it alone is worth, and moves with the scanty remnant of his wealth to a western wilderness. There, other habits prevail, and he can assume them without shrinking. He works and lives for himself and his family, and not to supply the wants, and suit his habits to the opinions of the most worthless part of the world. He perhaps dwells in a log house, sits on a wooden stool, eats plain food on a table of rough plank, and sleeps soundly on a corn-shuck or moss mattress. If friend or stranger comes, he is welcomed (with *true* hospitality,) to a share of the customary plain fare: but both host and visitor have work to perform, and both get away to it without sacrificing either time or business to the abuse of hospitality. By such a course

of labor and frugality, the ruined farmer may become rich before he dies—and if false shame had not prevented his pursuing any thing like the same course, he might have remained, and prospered as much, in the land of his birth.

But it is not only the impoverishment of our farmers that acts so injuriously upon the land and the condition of the country generally: the emigration which this impoverishment induces, is itself a tax that would serve to drain from Lower Virginia, all its average profit, and confer as much on the new and thriving western states. If a million of dollars worth of property annually is carried from Virginia to Alabama by emigrants, no equivalent is left, and the general effect is precisely the same as if that amount of tribute was annually drawn from the labor of the one country, and given to aid the improvement of the other. To do justice to this subject would require a much wider range than this letter permits, or than I have ability to fill—and I heartily wish that the subject could be fully and truly exhibited. But this is certain, that the tribute which Virginia and other old states annually pay by emigration to the new, is enough to produce a very great difference in their respective conditions, independent of all differences of fertility. The loss to our country by emigration is not only in the property of the emigrants: their persons constitute perhaps a loss equally great. They are generally enterprising and industrious, often well educated—and fitted in a high degree to increase the wealth and promote the prosperity of whatever land they inhabit. If such men left this state without one dollar of property, still it would be the loser by all that had been consumed in their maintenance and education. * * * * *

GREAT EXPLOIT.

On Saturday, a pair of horses before a light wagon, trotted over the Centreville course on Long Island, 100 miles in two minutes less than 10 hours, and, of course, won the bet of 1000 dollars. Is this not unprecedented!—*New York Gazette*.

This "great exploit" did not command universal applause—as witness the following remarks of the *New York Commercial Advertiser*, which are not more severe than well deserved.

It was a match against time by two horses belonging to Mr. R. B. Thiell, of this city, for \$1500, to trot in a light four wheel carriage, one hundred miles in ten successive hours; and was won, having two minutes thirty-five seconds to spare. If what we have heard be correct, the latter part of the match was a scene revolting to humanity. The horses performed wonders the first eighty miles, but evidently flagged the ninth hour, and on the tenth, became so completely worried, that, during a portion of that time, they were whipped with a degree of cruelty unheard of on any course in this country or in Europe. One of the papers states that men with whips had to drive them around the last mile, and that there is little hope of the recovery of one of these fine animals—should he even survive, he will never be fit for the road again. We shall be glad to give contradiction to this statement, if it be untrue. If it be true—and we had the story from the lips of a gentleman who was on the course—the authors deserve strong public censure, and it is the duty of the grand jury to indict them.

From the American Rail Road Journal.

HAMILTON'S SAWING AND BORING MACHINE.

This machine is designed for sawing and boring wood or timber, and is claimed by Colonel Hamilton in his specification to be "*an improvement in the mode of sawing felloes of wheels, circular and curved segments, mitre joints, tenons, and also boring of felloes and hubs of wheels;*" and generally for sawing circular, curved, and plain surfaces.

The machine is propelled by a two horse power steam engine. Animal or water power may be applied for the same purpose. The particular form required is sawed out of the timber with perfect accuracy and great expedition, by means of one or more thin narrow saws moving up and down. There is also belonging to this machine a horizontal saw for cutting segments of circles their proper lengths, and with proper inclinations for joints, tenons, &c. &c. Hubs of carriages are bored with perfect precision. All these operations are effected by the changing position of the material, accommodating itself as it comes in contact with the saw or auger, so as to receive the exact form, inclination, &c. required. Every thing is done, without marking or laying out, with mathematical accuracy by means of scales, which are distinctly laid down on the machine.

The machinery which guides and steadies the material in its movements may be readily varied, so as to form segments of wheels of greater or less dimensions; and the boring may also be more or less inclined. The scale indicates the exact position which the part of the machine that guides the material required to form a wheel,—for instance, of greater or less circumference: slats and legs of chairs may be made of various lengths, and thicknesses, and shapes, as fashion or utility may dictate.

This machine affords a happy specimen of labor saving, and may be advantageously applied to a variety of useful purposes. It occupies but little space, only a part of a small room. No skill is required in using it. A mere laborer, or a boy, can learn in a few hours to use the machine, and to produce the article as perfect as the most skillful machinist. Like many other labor saving machines, it performs that part of the labor which the accuracy and strength of the human hand are incompetent rapidly, and with precision, to perform; it, in fact, does the work which is the most difficult and toilsome to the laboring manufacturer.

The expedition with which materials of small value, and with very little waste, are converted into articles of comparatively much greater value is entitled to particular notice. Chair backs sawed from our native curled maple are worth from *eight to twelve and a half dollars* per hundred.

By the aid of this machine, which costs only about *three hundred dollars*, a common laborer may do the work of twenty or thirty mechanics. The merit claimed by Col. Hamilton consists chiefly in the facility and accuracy with which the material is adapted to the saw, so as expeditiously and uniformly to produce the exact form which is wanted.

CABBAGES.

M. Furstenau manures his cabbages before they close their heads, with sheep dung round the stems, which occasions them to grow very large and firm, and also to keep better.

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To the Editor of the Farmers' Register.

William and Mary College, June 17, 1834.

DEAR SIR—According to your request, I herewith transmit to you the substance of two lectures, much enlarged, containing my views in full upon the subject of the usury laws. I perfectly agree with you in the opinion, that this is a subject of the greatest importance, and one in which the agriculturist should feel a deep interest. The business of agriculture must form the chief occupation in every country, particularly in such a country as ours. It is the great *substratum*, if I may say so, the foundation on which are erected all other trades and professions. The agriculturist is in fact the great supporter and paymaster to all the other classes of productive and unproductive laborers. Every operation of trade, every change in the direction of capital, every regulating law, either directly or indirectly concerns his interests. There is no one, consequently, more deeply interested in the various complicated concerns of commerce, in the character and amount of the taxes, in fine, in the general system of legislation, than he is. Fortunately too, for the world, this interest is generally in complete harmony with every other. Its policy is to war on none, but suffer all to flourish under a system of free trade. "Land and trade," says Sir Josiah Child, "are twins, and ever will wax and wane together. It cannot be ill with trade but lands will fall, nor ill with lands, but trade will feel it." If then the usury laws, as I have attempted to prove, influence unfavorably the distribution and circulation of capital, check the natural division of employments, and produce stagnation of trade, it is a subject to which the agriculturist should look with a view to the correction of the evil. He, if any one, certainly has a right to be heard on this subject; for sure he may be, that if any thing work wrong in the complicated machinery of the laws, he will be the man to suffer by it, either directly or indirectly.

Some have supposed that the usury laws were necessary to draw to land the capital which it requires, by lowering the rate of interest to the level of profits in agriculture. I hope I have satisfactorily shown the fallacy of this opinion. Agriculture will always command its due share of capital; and any artificial attraction of capital to this department, by stripping others of their due proportion, would only serve to lower agricultural profits, and sink the general prosperity of the country: and recollect, too, that one great evil under which we are suffering in this state, is a general apathy, a want of that energy and activity which communicates life and spirit to every department of industry. Now if there be any force in the reasoning contained in the following sheets, I have shown that the usury laws, as far as they operate, have a tendency to check that salutary division of labor so essential to the prosperity of every community—to throw a clog on the great wheel of commerce, and consequently to increase that apathetic listless condition into which we seem unfortunately to have fallen. Besides, if the usury laws could, by their operation, actually reduce the rate of interest, (which fortunately they cannot) they would undoubtedly increase the tendency in labor and capital to emigrate to the regions of the west; a tendency which has already proved one of the most powerfully operating causes against the pros-

perity of our state, by sweeping from the land and from commerce, capital as fast as it accumulates, to spread over the distant regions of the west. So far then from the views which I have taken of the usury laws being hostile to the interest of agriculture, it is directly the reverse—I contend they are in perfect harmony with that interest.

I hope then, that the following sheets will be honored with a perusal by most of your subscribers, especially by the agricultural portion. I am well aware that my opinions on this subject are far from being popular. If, then, I can succeed for the present in awakening the spirit of enquiry, and of directing public opinion to the subject, I shall be fully compensated for my labors.

With high respect, and great regard,
I am, dear sir, your ob'dt serv't,

THOMAS R. DEW.

For the Farmers' Register.

ESSAY

ON THE INTEREST OF MONEY, AND THE POLICY OF LAWS AGAINST USURY.

By THOMAS R. DEW, Professor of Political Economy, Metaphysics, &c. College of William and Mary.

There is no subject connected with the science of political economy, which is more interesting or important, than that of money—the great measure of value, and the most potent agent, by which labor and capital are stimulated into productive action, and the exchanges of society are effected. I have already in former lectures given you an account of the causes which render a circulating medium necessary in the progress of society, and pointed out the circumstances which determine the relative values of the metals and other commodities throughout the civilized world; I have shown you how, by judicious banking, the circulating medium may be economised, and a convertible paper be made to perform the functions of the precious metals, at the same time pointing out the multifarious evils consequent on this system, so great and hitherto so universally attendant on it, as to render it a problematical question whether banks up to the present day, have not generated more mischief than good. In my present lecture I propose to conclude my remarks on the subject of money, by an investigation of the principles which regulate interest, and an examination of the policy of those laws which fix and limit its rate.

If we look to the history of the world we find that in almost all ages, and in all countries, commencing with the Israelites, and continuing down to the present time, lawgivers have attempted either to abolish interest altogether, or limit its rate. Money seems to have been regarded with a jealous eye; it has been looked on as differing from all other commodities—as forming a sort of anomaly in the politico-economical world, not regulated by the laws and principles which determine the prices, hires, and rents of other species of property, but as being entirely *sui generis*, free from the harmonious action of supply or demand, and consequently requiring the guardian care and restraint of the legislator. I need scarcely inform you that my own opinions on this subject are in unison with those entertained by me on other branches of our science, and shall endeavor to prove to you, that

with few exceptions, the interest of money ought not to be restrained by law.

Interest may be defined to be the price which the borrower of capital pays the lender for its use; and although money be the material lent, yet it is not generally the money which is wanted by the borrower, but the money's worth—the property or commodities which can be bought with the money. No one borrows money to hoard. Every day of its detention in the hands of the borrower is so much loss to him. He must lay it out in some profitable manner, or he will lose the interest which he is paying. Having premised thus much, I will proceed to examine the principles which, in the absence of all law, regulate the rate of interest.

I. Rate of interest depends on profits, and risk incurred by the lender.

The first proposition which I hope to establish, is, that rate of interest depends on the compound ratio of the profits which the borrower expects to make on the money lent, and the risk which the lender runs of never recovering his capital. It is evident that all other things being equal, the borrower will be willing to give a higher rate of interest for money when he expects to make higher profits by its use, than when his profits are low. This leads me for a moment to advert to the laws which regulate the rate of profits. In my lecture on profits, I endeavored to prove that the general rate was determined in each country by the proportion between the aggregate capital of the society and the channels of profitable investment. Hence, in old and densely populated countries profits are lower than in new and sparsely populated, especially if the soils be nearly equal in fertility. For, in the former, the accumulated capital is redundant in proportion to the channels of investment, whereas, in the latter the reverse is the case. Thus profits are lower in Holland than in England, and lower in England than in the United States. Again, in the same country from the same cause, profits are higher in one section than in another, especially if the country be very extensive like the United States of America. Thus we find the rate of profits generally higher in the middle than the northern states, higher in the southern than in the middle—and higher still in the new states of the west than in the southern. So likewise in a large state like Virginia, we witness frequently a considerable difference in profits from section to section.

In small states there cannot exist a very great difference in the average rate of profits in different sections, because of the tendency in capital to move from the section where profits are low, to those in which they are high, until the equilibrium is restored. When the sections are large and extensive there are so many ties of friends, relations, prejudices, and associations, which bind us to our native district, and so many obstacles and checks thrown in the way of emigration, as permanently to prevent a perfect equilibrium by the transference of labor and capital. In the western portion of Virginia, (our state) where the soils are fresh and the population thin, profits are perhaps higher than in the eastern portion—and no doubt one very beneficial effect of the great central improvement of Virginia, will be to raise profits still higher in the western portion of the state by the facilities of transportation which will be offered to

the producer, and the consequent stimulus which will be given to increased production, and beneficial changes in the modes of tillage.

The rate of profits, however, not only varies from country to country, and from district to district of the same country at the same time, but it varies likewise from year to year, with the variations of seasons; with the increasing or decreasing energies of the population; with the opening of new, or the suppression of old markets and channels of trade; with the rapid multiplication or sudden destruction of population; with the failure or extension of credit; and with a thousand other circumstances which it would be needless to enumerate. Wars, embargoes, restrictions, plagues, the discovery of new routes and new countries, internal improvements of every description, and the spreading of civilization—all have a tendency to influence the ever fickle rate of profits, and prevent its ever permanently settling at any one point. Thus we see what is termed the average or general rate of profit in a country, varies with the course of trade and the general prosperity of the country.

But again: although I have shown you in a former lecture that all the advantages and disadvantages of different trades are equal in the same community, or tending to an equality, yet the actual profits vary according to the nature of the employment, whether agreeable or disagreeable, hazardous or not. Thus a writer in our country says "farming gives a remunerating price for labor, and from two to three per cent. on capital—including land and stock. The retail merchant receives a remunerating price for his labor and twenty-five per cent. on his capital. Manufacturing gives a remunerating price for labor, and from ten to thirty per cent. on capital. Public funds four and a half per cent. on capital. The mechanic receives a remunerating price for his labor and one hundred per cent. on his capital." It is a matter of no consequence whether the above scale be exactly correct or not: all I wish to establish is the different rates of profits which may exist in different trades and professions in the same community. I have no doubt agricultural profits are placed too low, perhaps they can never fall permanently below profits on capital invested in the public funds, which are placed at four and a half per cent.; but agricultural profits will always be near a minimum, because of the security of this species of property, the pleasure and gratification attending the occupation, the independence of the landholder, the right of suffrage, &c. &c.

Lastly. Small capitals are expected to yield much higher proportional profits than very large capitals. The itinerant pedlar who carries his goods on his back, or in his cart, at much risk and inconvenience, sells at much higher profits than the regular stationary retail merchant. The large capitals in the towns yield a much smaller proportional profit, than the small capitals in the country; hence goods are always cheapest in the towns. If the Rothschilds can make three or four per cent. on their enormous capital, they are well contented: if the little grocer who has gotten \$200 ahead does not make 50 or 100 per cent. on his capital he does but a very poor business. Is it not perfectly absurd then, so far as interest is dependent on profits, to attempt to

regulate it by law? for we have seen that the general rate of profits varies from country to country, and from section to section of the same country, and from year to year: again, that particular rates vary with the several trades and professions of society, and with the magnitude of the capital employed. Does not reason and justice then most clearly demand that the general rate of interest may be allowed to vary with the general rate of profits, and that particular rates may vary with the rates of profits, in the several trades in which the borrowed capital may be employed? Is it not the height of absurdity in the legislator to prescribe one rate for all the different sections of the same state or nation, and for a series of years in succession, entirely regardless of the fluctuations and variations in profits upon which the rate of interest so essentially depends?

In 1627 we are told that the Plymouth Company were able to pay 30 per cent. on borrowed money. The year before, they had paid 45. This they were enabled to do in consequence of the high profits in a young and fertile country. Why should they be interdicted the hire of money at a high rate of interest, when their profits were so high as to justify it? Profits in Europe, especially in England and France, rose with the successful establishment of commercial intercourse with our western hemisphere; and with the East Indies, by the discovery of the passage around the Cape of Good Hope. Why should not the interest of money be suffered to vary likewise? In the United States profits rose far beyond the ordinary level during the long and expensive wars of Napoleon: Why should not the interest of money have been suffered to conform to the increasing rate of profits? In Virginia, in ordinary times, not more than six per cent. can be obtained for money, because profits are low: in Missouri, however, where they are working a virgin soil, with a thin population, men in good business can afford to give 10, 15 or 20 per cent. on money, because profits are very high. Why then should the law attempt to limit the rate to six per cent.* And when the great central improvement of Virginia shall be completed, as I hope it will be in a few years in spite of all the discouraging circumstances under which we labor from the apathy of the state and the appalling pressure of the times, profits will no doubt rise throughout the state, but especially along the line of the improvement: why, again let me ask, should not interest of money be suffered to follow the rising tide of our prosperity?

The manner in which interest is affected by risk.

After having, as I hope, conclusively shown the absurdity of the usury laws, in attempting to regulate interest because of the very fluctuating character of profits which is one of the regulating elements of the rate of interest, let us now cast a hasty glance at that other element—the risk incurred by the lender of losing the sum lent. It is very evident that all other things being equal, the interest of money will vary in proportion to the risk of loss. Where the risk is great, high interest must be demanded to indemnify the lender

* I give this merely as a hypothetical illustration. The law in Missouri allows an interest as high as 10 per cent. when specially contracted for; in all other cases only 6 per cent.

against the loss which he may sustain. What then does the risk depend on? Principally on three things:—*First*—on the personal character and credit of the borrower. *Second*—on the nature of the employment in which the borrowed capital is to be invested—and *Thirdly*—on the character of the government, and administration of justice.

First. An individual about to lend, will certainly lend to a man of wealth in preference to one of no wealth, when the rate offered is the same; and again, when they are equal in point of wealth and security, preference will be given to the man who is most punctual, who pays most promptly and most cheerfully. Hence it is easy to explain why governments are generally enabled to borrow at a lower rate than individuals: It is because their credit is better established and more generally known, and because too, the government stocks, in consequence of the known solvency and credit of the nation, can readily be converted into cash by sale in the market, or may be made to perform, to a considerable extent, the functions of a circulating medium, by a ready transference from hand to hand, through the whole extent of an empire: whereas the notes and bonds of individuals have a sluggish circulation only, and that through very narrow districts or neighborhoods. Hence government stocks, paying the marketable rate of interest, always sell beyond par, and hence too, we frequently find the three and four per cent. stocks selling higher in the market than those yielding higher dividends, because the latter are liable to immediate liquidation, whereas the former perhaps may be irredeemable for many years. When Venice, Genoa, and Pisa, were in all their glory, with an extensive commerce pouring the riches of the world into their ports, they were enabled to borrow all the money they wanted at an interest of from five to ten per cent., while the more powerful, but less wealthy and less punctual governments of Spain, France, and Germany, were obliged to pay 30 and 40 per cent. interest, for the sums which they borrowed. It is needless to dwell longer on this point: every body knows that *ceteris paribus* the man of wealth and responsibility can borrow money on better terms, than he who has no credit nor wealth.

Second. The risk depends upon the nature of the investment to be made of the borrowed capital, in all cases where the lender depends upon the success of the investment for the repayment of his money. Thus there has always been more risk and hazard attendant on the shipping trade than upon other commercial operations; hence the interest of loans made on the credit of the shipping trade has always been high, particularly in ancient times, in consequence of greater risk then attendant on navigation in its infant and rude state. In Athens, we learn that the interest of the money employed in the trade with the countries on the Euxine and Mediterranean seas, amounted to 80—(Say says 60) per cent.—while money was generally lent in the city on good security for only 12 per cent.

In Virginia, and I believe in most of the states, there is no restriction, I suppose for the reasons just stated, on the interest of money lent upon the credit of the shipping trade. When a loan is made to an agriculturist, and the principal secured by mortgage on the land, the rate of interest will

always be near a minimum, in consequence of the great security. "No capitalist would lend" says McCulloch "on the personal security of a gun powder manufacturer, and on mortgage over a valuable estate, at the same rate of interest." The capital of the former may be dissipated in a moment, and the ability to repay be entirely destroyed, whereas no accident can destroy the ability to refund in the latter case. Extreme hazard is known to attend the mining operations in South America; many mines may be opened before one profitable one may be discovered. The risk being very great, the rate of interest is likewise very high—20 and 30 per cent. being frequently paid for money employed in those operations. The larger portion of the interest in these cases, is in fact a sort of premium of insurance, and is to be considered by no means as a hardship on the borrower; for his profits rise with the risk of the investment, and enable him, in case of success in the business, to pay the high rate of interest with just as much advantage to himself, as lower rates are paid by less hazardous trades. The risk rises to a maximum when a spendthrift borrows money to pay his debts, without being able to give any security. In that case, the only hope of a return is based on the reform of the prodigal, and the confidence in his talents, industry, or trade. The risk in this case is so great, that few can be found to lend to such persons at any interest, except warm friends or relations, and they are actuated rather by the spirit of charity and friendship, than of gain, and consequently charge but moderate interest. Hence the apparent anomaly sometimes exhibited, of the reckless profligate borrowing money at the ordinary marketable rate of interest.

Third. The risk varies with the character of the government and the administration of justice in the body politic. Under a well regulated government, where capital is well protected, contracts enforced, and every right secured to the possessor, the risk, so far as it depends on the government, is reduced to a minimum, becoming an almost evanescent element in the calculation. When the government, however, is bad, capital insecure, and contracts not enforced, the risk rises to a maximum, and predominates over every other element in the calculation. Thus in Rome, the constant quarrels between the Patricians and Plebeians, and the frequent reversions of debt and interest, rendered loans exceedingly hazardous, and the rate of interest rose, as a necessary and inevitable consequence, so high as to indemnify the borrower against this extraordinary risk, flowing from the nature of the government. Thus we find the virtuous Brutus taking 45 per cent. on money, and we are told that a frightful usury sprung up through the Roman commonwealth, the effect of those very laws and clamors of the people directed against it. In the middle ages, property was insecure, and governments bad, and the risk consequently very high; hence the prevalence of an exorbitant rate of interest as a necessary consequence. Hallam tells us, on the statement of Matthew Paris, that in the reign of Henry III, of England, the debtor paid 10 per cent. every two months, or 60 per cent. per annum upon borrowed capital; whereas in Italy, interest was comparatively low, because the governments were there better, and contracts enforced. At Verona,

formerly, interest was fixed at 12½ per cent., and the republic of Genoa paid only from seven to ten per cent. on borrowed capital. It is upon this principle that Storch explains the difference between the rates of interest in the United States and Russia. Profits are no doubt higher here generally than in Russia, and yet the marketable rate of interest is higher in Russia than in this country. The difference arises, says he, in the difference in the laws and administration of justice in the two countries. Capital is more secure here, contracts more rigidly enforced, and consequently, the risk of lending money less than in Russia. In the Mahomedan countries, where capital is insecure and liable to be seized on by the rapacious Pachas as soon as it makes its appearance; there is a disposition to hoard; and besides this, the law positively forbids any interest whatever on money, and the consequence of these combined causes, says Montesquieu, is to increase the risk greatly beyond what it is in better governed countries, and consequently to produce most frightful usury in all cases where money is actually lent. Interest is said to be ten or twenty times as high ordinarily in those countries, as in Europe. Upon the same principle we may account for the exorbitantly high interest observed by Adam Smith to exist in Bengal, and the East Indies generally. If the stay and relief laws of Kentucky had been long continued, or should be frequently enacted from time to time, so as to destroy the confidence of the community in the honesty of government, and the validity of contracts, we should witness in this country the same exorbitant interest, the same frightful usury, which is now observed in the Mahomedan countries, and the east.

I have thus given you, I hope, a satisfactory analysis of profits and risk, the two elements or ingredients of interest, and have found the latter still more fluctuating and uncertain than the former. How absurd then must be the usury laws, which endeavor to limit and fix the rate of interest, which depends on elements that no human wisdom or power on earth can ever control and regulate? I should as soon expect to make the fabled Isle of Delos stationary upon the moving billows as to fix that which so essentially depended upon two such unstable elements. The other branches of the argument against the usury laws are but corollaries to this main proposition, which I have been attempting to establish. I shall now proceed to inquire into the manner in which these laws operate upon the public prosperity and morality.

II. Pernicious influences of the Usury Laws.

First then we assert, and the assertion requires no proof, that the usury laws are unjust and unequal in their operations, restraining the holders of a particular species of capital from employing it in the most lucrative manner, whilst the holders of other species of capital are left in the enjoyment of perfect liberty. The owner of lands and slaves may take what rent and hires he pleases—the merchant is not restrained as to his gains, nor the manufacturer to his profits. Why then should the money holder be prevented from taking the interest which the borrower is willing to give? Is it because the money holders are vicious, selfish beings, whom it is the policy of the laws to sup-

press and discountenance? I apprehend not. Widows, orphans, the defenceless and helpless, are often the money holders. When a father dies, to whom does he leave his money? Most frequently to the invalid son, or the exposed and defenceless daughter. To his sons who are fitted for action on the great theatre of life, he gives other kinds of property which require more skill and care to manage them. The salaried men and all the functionaries of society are to be ranked among the money holders: Are these classes of such a character as to require the strong hand of legislation to correct their mal-practices? Certainly not. As a class, I should say the money lenders are generally speaking, the most harmless and defenceless, or the most talented and respectable members of society. Is it because money is a commodity *sui generis*, the holder of which is enabled by its means to take what interest he pleases, the borrower being obliged to give it? There are many, I believe, who absurdly entertain this opinion—who really believe that money is in the economical world what the superstitious believe the witches to be in the physical, a something not bound down and governed by the laws of gravity and cohesion.—by the laws of supply and demand, but as possessing an active principle of its own, a sort of *vis insita*, of the most dangerous character, not only not governed by the ordinary laws of nature, but capable by its own energy, of resisting and deranging them. Those who entertain such an opinion however, either do not or cannot understand the nature of the circulating medium, and the laws which regulate the rate of interest. Interest, like the price of every thing, is determined in the market, by a struggle between the borrower and lender; the former of course wishing to fix it as low as possible, while the latter would make it as high as possible. When profits are high, or much is to be made by the use of capital, or the risk is great, more will be demanded on the one side and conceded on the other, than when the reverse is the case. Capitalist competes with capitalist, as well as borrower with borrower: where much is to be made by money, much will be given; where little is to be made, little will be given. Hence in the new states of our confederacy, interest is much higher than in the old, because more can be made by the use of money. In Alabama for example, eight per cent. interest may be legally taken, in Mississippi ten, in Louisiana ten, in Indiana ten, in Illinois twelve and a half, and Missouri ten,—and it is believed these rates are generally rather below the marketable rate of interest in those new states: whereas in all the old states, with the exception of New York, South Carolina and Georgia, six per cent. is the legal rate, and perhaps in most cases nearly coincident with the average market interest.

The interest of money, it must be remembered, does not depend on the quantity of money in the country, but upon the whole quantity of capital, (of which money is one, and by no means the most valuable item,) compared with the channels of profitable investment. As I have already said, when money is borrowed, it is not the money, but the money's worth which is wanted. The merchant wants goods, the agriculturist new lands, or improvement of old land; the manufacturer wants machines and raw materials; the lawyer wants education and professional skill. They

borrow money for these several purposes, and the rate which they are willing to give does not depend on the quantity of money in the country, but on the gains which the merchant, the manufacturer, and the agriculturist expect to make on their goods, on their manufactures, on their land, and upon the emoluments and reputation which the lawyer and doctor have in prospect. Money is merely the agent of circulation of capital generally. If money is scarce, its value rises; if too plenty, it falls; and the rate of interest is never *permanently* affected by its high or low value. If \$50 be worth to-day as much as \$100 was yesterday, \$3 interest on the \$50 will be worth just the same as \$6 on the \$100. The only effect produced on interest is while the change in value is taking place. Thus, let us suppose the banks begin to over-issue; there is a consequent increased facility of borrowing, which may lower interest *temporarily*; then an appreciation of prices ensues, and so soon as prices become stationary, interest rises to the rate which is determined by profits and risk.

So far from there being any reason for restraining the rate of interest, there are some reasons why it is better regulated by the laws of trade and the influence of public opinion than perhaps any thing which can possibly be mentioned in the whole catalogue of commercial transactions. *First*. Money being the universal measurer of value, is better known, its agency in the hands of individuals better understood, than any other species of property whatever. *Second*. Great concentration of value in small bulk renders it the most transferable of commodities, and consequently it passes more rapidly from places where it is redundant to those where it is deficient, than any commodity we know of. From this cause it is, that competition among capitalists is more certain to keep down the *hire of money* to a fair proportion to profits and risk, than any other species of hire whatever. You cannot carry land and houses from one section to another, to keep down rents; manufacturing establishments are incapable of locomotion, and therefore the exorbitant profits of one are slowly corrected by another: labor moves so sluggishly from district to district, that Smith pronounced man the most immoveable of lumber. Hence the slowness with which the equilibrium is restored in the labor market. But money passes from section to section with all the rapidity of the mail and the steam boat. Is there a great demand here for it to-day, while there is a relative redundancy elsewhere? The easy transference of it from place to place, will quickly restore the equilibrium. If A, a monied man, charges too high an interest in proportion to profit and risk, B, another monied man in the same neighborhood will find it to his interest to take less: and if neither will take a fair rate, capital will speedily flow in from other quarters, and relieve the pressure. At this moment, large amounts in specie are pouring into the United States, in consequence of the money pressure; and no doubt if public confidence could be suddenly restored, we should be found to have a greatly redundant circulating medium.

Hires, rents, interest and prices of all descriptions, are determined by the ratio of the supply to the demand. Now if a restraining law should ever become necessary, it would be in those cases where the price rose generally greatly beyond the

ratio of deficiency. Upon this principle, the great necessities of life, corn and wheat particularly, would require the regulating agency of law, more than any other commodities whatever. When the harvests are deficient, the price of corn and wheat always rises immensely beyond the rate which would be indicated by the defect in the harvest. This is a fact which has been noticed as far back as the time of D'Avenant, in England. He has given us the following table, which although not perhaps mathematically correct, yet is sufficiently so, no doubt, to illustrate the fact.

Defect in wheat harvest.		Above the common rate.	
1 Tenth,	Raises the price of wheat	3 Tenths,	
2 do.		8 do.	
3 do.		1.6 do.	
4 do.		2.8 do.	
5 do.		4.5 do.	

Tooke in his very able and elaborate work on prices, gives us this table of D'Avenant, with the remark that "there is some ground for supposing that the estimate is not very wide of the truth, from the observation of the repeated occurrence of the fact, that the price of corn in this country (England) has risen from 100 to 200 per cent. and upwards, when the utmost computed deficiency of the crops has not been more than between one-sixth and third of an average;" and again he says, "considering the institutions of this country relative to the maintenance of the poor, if there should be a deficiency of the crops amounting to one-third, *without any surplus from a former year, and without any chance of relief by importation* the price might rise five, six, or even ten fold." It is for this reason that farmers who make more than enough to supply themselves are benefited by a *general* scarcity, in consequence of the more than proportional rise of produce. This remark I have often heard made by the most *successful* farmers with whom I am acquainted. Mr. Tooke ascribes (and I think very correctly) the extraordinary impulse which was given to the agricultural interest in Great Britain from 1793 to 1809 to an unusual number of bad harvests during this period, which raised the price of wheat greatly beyond the defect of the harvest, and consequently threw into the hands of the agriculturists a much larger amount of capital than more favorable harvests would have done. Thus we see that the great staple of life, is precisely that article which rises most rapidly and to the greatest extent in the market, from a defect of quantity: If then the price of any article in the world should be regulated by law, the price of corn ought, because in time of scarcity the holders of this article can get much more than a remunerating price for it. Why then are not such laws passed now? Because they have been tried and found disastrous. They increase the very evil to be removed. The holders of corn have ever been disposed to lock up, and secrete their produce when the law attempted to make them sell at less than the rate adjusted by the struggle between the buyers and sellers. It is certainly the interest of all the corn farmers in the world that there should, for example, be such a scarcity, as that each one on the average should have a sixth or third less for sale—for the price would rise greatly beyond the defect—but no one apprehends from this, a combination of farmers to destroy a portion of their crops, because such a combination is impossible, and, consequently, it is

the interest of each to produce as much as possible. If corn were made by a licensed few, under the control of a company of directors, there is no question but that such would be the interest of the producers, and a restraint on production might be laid by the company of directors. In that case the law might interpose with advantage, not in regulating the price, for even in that case the price should be left to the adjustment of the market—but in either destroying the monopoly, or controlling the directors, in regard to their restraint on production. If then there can be no necessity for a law to regulate the price of corn, which is known to rise higher from scarcity than any other article whatever, much less can there be any need for the regulation of interest by law, because of the supposed advantage which the holders of the money capital possess, in the struggle for the adjustment of interest. The rate of interest depends on profits, and the latter, as we have seen, depend on the proportion of the whole capital of the society to the channels of profitable investment. The capacity of the capitalist therefore, to obtain a high rate of interest, increases in a particular district of country from a deficiency of capital generally—and not wholly from a deficit of money. Now this general deficit of capital does not enable the money lender to raise the interest of money to any thing like the height to which a similar deficit in corn or any other necessary of life, will enable the holder of those articles to raise their price. The laws then restraining the rate of interest cannot be justified upon the ground that the holders of money have it in their power to take what interest they please, for the fact is not so. They have not, as we have just seen, by any means so great a power over the borrower as the corn holder has over the purchaser; and if policy requires the latter to be left free, surely the former ought likewise.

Again, if it were true that the money holders, when the quantity of money was small, could command a disproportionally large interest, then it would follow, (for the remark is susceptible of great generalization,) that when the quantity of money happened to increase, the rate of interest would sink disproportionally low. That is universally the case with corn, and with all articles which rise in price, higher than in proportion to defect; they always sink more than in proportion to redundancy, so that if the holders gain in the former case, they equally lose in the latter. Now if it were true that money holders could command an interest greater than in proportion to the deficiency of capital, they ought not to be restrained: for it would be certain that in case of redundancy of capital, interest would sink more than in proportion to redundancy—and consequently the loss and gain should surely be left upon every principle of equity and justice, to balance each other. Besides: public opinion has much more influence on money lenders than perhaps any other classes of the community, because the value of money is well understood, the value of its agency estimated, and consequently, if the money lender, from a combination of circumstances, should be enabled to take advantage of the exigencies of the borrower by the exaction of exorbitant interest, the transaction is at once assailed by an indignant public opinion. Whereas you may take advantage of the customer in selling goods, or any other marketable commodities what-

ever, merely because of the indefiniteness of quality and the general uncertainty and instability of prices. I shall prove, before finishing the subject of interest, that public opinion has been too much excited against the money lender, and has produced rather a bad than a good effect. Certain it is however, that it is brought to operate against usurious interest, with as much power and efficacy as against any mercantile transaction whatever. I hope then I have shown that there is nothing in the nature of money, or money transactions, calling for the special interference of the legislator, and justifying the restriction on the profits made by one class of capitalists, while all others are left free to make what gains the state of the market will allow.

I shall now show that the laws restraining the rate of interest are inexpedient and impolitic in relation to public prosperity. I have before shown you that it is conducive to the public weal, to give to capital and labor, as much freedom as possible. Freedom of trade and action, contributes to the welfare of individuals, of countries, and nations. The law restraining the rate of interest, so far as it operates, impedes the wholesome circulation of capital from hand to hand—it is a clog thrown upon the great wheel of commerce—it is in fact, part and parcel of that detestable mercantile system, under whose blighting influence, the prosperity of the south has been arrested, and a garden of Eden almost converted into a wilderness. A has money, and wishes to lend it to B for seven per cent. which B is willing to pay; but the law says "No, you shall not receive more than six." Does not the law in this case impertinently interfere with individual transactions, and claim to understand their interests better than individuals themselves? What would be the fair presumption in this case, according to the principle of the free trade theory? Certainly that B would employ the money to greater advantage than A, and consequently it would be better that B should have it; but the law forbids him, and therefore A is induced to employ the money himself, with less advantage to the community. A perhaps may be a salaried man, a functionary of the state, whose entire services should be devoted to his office; the law forbids his lending at the fair marketable rate of interest, and consequently, may force him into trade, very much to his own inconvenience and the detriment of the public. So far then as the usury laws operate, they act injuriously by checking that free circulation of capital, so essential to the prosperity of the country; they tend to prevent that perfect division of labor and trade, which the progress of society generates. When the marketable rises above the legal rate of interest, the monied man, whether competent or not, is induced to enter into active business, and thereby exclude some more efficient individual, merely because the laws will not allow him to take a fair rate of interest for his money.

Again, suppose an individual called on for the payment of a debt. He has property amply sufficient to meet all demands, but has not the ready cash: he wishes to borrow at seven per cent., the law however will allow but six, which we suppose less than the money can be borrowed at. Under these circumstances, his property must be sold, and we all know the result of these forced sales. Real estate in Virginia which brings two-

thirds of its *real* value under the hammer, sells well. What then is the effect of the protecting law in this case? Why to make the debtor, by a sale of property, pay 33 $\frac{1}{3}$ per cent. virtually for money, instead of six. In times of great pecuniary embarrassment, like the present, the property sold often does not bring more than a fourth or fifth of its value. It would be better in such cases that the debtor should pay two or three hundred per cent temporarily on money, than have his property thus sacrificed. If, during these pressures, money prices fall never to rise again, then there would be no advantage in borrowing money to save property: but every body knows they are of short duration, and prices quickly regain their former level. Under these circumstances, the wisdom of no set of legislators that have ever yet appeared in this world, can determine the rates which may be advantageously given for money by the borrower. Such circumstances evidently throw the subject of interest entirely beyond the reach of definite calculation, and of course, out of the region of wise legislation. And suppose for a moment that a rate of interest, too exorbitant for the occasion, should be obtained, may not the borrower soon relieve himself from the pressure by paying off his debts by new loans? whereas if your property is once sold under the hammer, at one-third or one-fifth of its real value, there is an end of the matter—the sacrifice is perfect and complete, without the possibility of palliating or averting it by subsequent good fortune.

We know that tradesmen very frequently see an excellent opening for the employment of capital: if they are enabled to command it immediately, high profits may be realized, and their fortunes made. Such men must go beyond the ordinary rate of interest to procure the capital required; but the wisdom of the law steps in, and interdicts the transaction, and thus robs the individual of his profits. Has this man, do you think, any reason to thank the guardian law for its unlucky interference? Six per cent. is the legal rate in Virginia, and I believe for some time past has been the market rate too; and yet I have known instances of individuals borrowing at the rate of ten per cent. both for purposes of trade and agriculture, who have been enabled by their returns, to pay the interest, and realize handsome profits. Of course this happens only under peculiarly advantageous circumstances, and therefore, ordinarily to borrow money at ten per cent. for business or trade would be ruinous to the borrower. But when those circumstances do occur, the borrowing is an advantage, and the law is a very unwise one, which interposes a bar, and declares its judgement superior to that of the parties concerned.

A young man enters upon the great theatre of life, full of buoyant hope and of laudable zeal. He wishes to engage in the business for which he is best prepared. Capital is wanted—having nothing but his energy, talents, and prudence to back him, he is obliged to give a little more than the ordinary rate of interest to cover the great risk occasioned by lending upon personal security alone. But the wisdom of the law dissipates all his hopes and projects, by preventing his borrowing at such a rate as his circumstances may alone enable him to do. Can there be wisdom in a law which thus arrests the laudable enterprise of the aspiring young man, and forces him into a state of inac-

tivity and apathy? The French proverb well and truly asserts "c'est le premier pas qui coute." The first step in life is the most difficult and the most important; upon it will generally depend your weal or woe. If then, when you come forth, with all the ardor of youth, pressing forward to the high mark which imagination has pointed you to in the vista of the future, and find all your enthusiasm repressed, and ardor chilled, by the unwise interference of the law, you sink into listlessness and idleness; the principle of energy is destroyed within you; and you are drawn by a desire of excitement and by a disposition to relieve the insufferable tedium of idle hours, first into dissipated society, and then through all the scenes of youthful frolic and youthful sport, to the darker vices of gambling and drinking, with all the black and melancholy train consequent on these prolific sources of mischief to the whole human family. "Idleness" says Bunyan "is the devil's workshop," and the money making propensity in the human family, much as it has been reviled and slandered by the unreflecting and indiscriminating observer, turns us often from the path of iniquity and vice, generates habits of regularity and order, and saves us from that intolerable idleness, that dreadful *ennui* which drive too frequently their unfortunate victims to the card table and the bottle. My warm and urgent advice to you, then is, that you should as early as possible when your education is completed, and you are prepared to enter actively upon the bustling scene of life, engage in some business, some occupation, which may afford you profit and employment. A short season of vacancy at this period of your life may be decisive of your future fate: I cannot therefore but look with an eye of condemnation on any law which has a tendency to withhold capital from the grasp of the ardent and young adventurer into life.

We have already seen that profits in some trades are much higher than in others, owing to greater risk, uncertainty, expense, disagreeableness, &c., and that money lent to the adventurer in these hazardous trades, upon the credit of the business alone, must necessarily and properly be at a high rate to cover the great risk. Again, I have shown you that higher profits are made on small capitals than on large ones. Hence business flows towards great cities, because of the great capital there accumulated, and the consequent cheap and advantageous manner in which all trades of an enlarged and extensive character are carried on. Capitalists who have millions at command are contented with two or three per cent. profit, men who have \$1000 or \$2000, or still more, \$100 only, must aim for higher profits: two or three per cent. profit would not stimulate to action at all in the latter case; 50 or 100 per cent. profit must be made, or the business would be given up. In the April No. of the Farmers' Register, mention is made of a capitalist in Europe borrowing \$10,000,000 at two and a half per cent. for the purpose of taking up some Pennsylvania stock. This is a good rate of interest on so large a capital, but it would not do for a capital of \$10,000 and much less for one of \$100. It is for this reason that the small capitalists take possession of the little trades, and the large capitalists push forward the great business of the world, and thus arises a most salutary division of labor throughout creation. The selling of poultry, of butter and

milk, of vegetables and fruits, the business of the village grocer and the country merchant, &c. &c. always fall into the hands of the little capitalists, and yield high relative profits. The great import and export trade of every country, the great retail business of such towns as London, Paris and New York, "all the great factories and manufacturing establishments, all the great transactions of commerce, all the great masses of property, the roads and canals, the mines of gold and silver, and iron; the cargoes of sugar, cotton and indigo, that are constantly being transferred from one possessor to another" on the royal exchange of London, or at New Orleans, or New York; all this is done by the intervention and agency of great capitals. Men therefore who have very large capitals to lend, naturally seek men who are engaged in large and extensive business; men who have but little to lend would seek those carrying on some business commensurate with the capital to be lent; and the rate of interest would and ought to vary in the two cases. A man who lends out 50 or \$100 to the little village grocer, or the seller of vegetables and fruits, might with propriety demand a very high interest, whereas he who would lend his thousands to the great merchant or farmer, would take the lowest rate. In London the great loans consisting of hundreds of thousands, and millions, are contracted for at two, three and four per cent.; the small ones at a much higher rate. Colquhoun, in his London Police, says that money is lent at ten per cent. per day to barrow-women who sell fish, fruit, &c. in the streets.*

Is it not then the very climax of absurdity in the legislator to prescribe one rate of interest, in all these cases? The moral effect of the law on those who have very small sums to lend, is of the most pernicious kind. It is no object with a man who has \$100 only to lend out to gain \$6 on it: allow him, as circumstances direct, to get ten or twenty, which perhaps some little grocer or fruit seller might well afford to pay, and immediately you stimulate such an individual to save as much as possible—the principle of accumulation triumphs over that of dissipation. His gains, though still small, are sufficient to call all his energies into action, to summon him away from the grog shop or the cock-pit, to make him orderly and economical in his habits, cheerful and contented in disposition; of such an individual, however humble his walk in life, we may truly say in the graphic language of the poet,

"Motion is in his days,
"Rest in his slumbers; and cheerfulness
"The handmaid of his toils."

Such an individual becomes a good husband, a good father, and a good member of society. Let

* The following table is given us in the Penny Magazine and serves to illustrate what I have advanced on this head. It is given on the authority of Mr. Mott, the contractor for Lambeth work house, said to be a most intelligent gentleman. "I made a calculation of the interest paid by them, for their trifling loans, says Mr. Mott, and I found it to be as follows:—

A loan of		pr. ct.	pr. ct.
8 pence	{ If redeemed the same day pays interest at the rate of	5200 weekly	860
4 do.		3900 "	650
6 do.		2600 "	433
9 do.		1733 "	288
1 shilling	- - -	1300 "	216

an unwise law however prevent him from procuring that rate of interest which his small capital will command, or in other words induce him to pocket his money without lending it out, or placing it in trade, and immediately such a man may well utter the most appropriate prayer for poor frail human nature, "Lord deliver us from temptation." The money in his pocket is like fire in the mountains.

Agitat totam molem.

It invites him to the scene of dissipation, it carries him to the tippling shop, to the race field, to the cock pit, or the gambling table. The principle of dissipation triumphs over that of accumulation. Such an individual may soon become the torment and disgrace of his family, the disturber of the neighborhood, and finally a fit subject for the gallops or the penitentiary. The law in this case as far as it operates, produces the same effect Sismondi so beautifully describes as being produced in Florence by the general insecurity of capital in consequence of the wars, dissensions, invasions, &c. to which that city was liable during the troubles of the middle ages.

The law limiting the rate of interest then, evidently has a tendency to produce the most pernicious influence on small capitalists, by checking frugality and industry, and encouraging dissipation and prodigality; because a small rate of interest although an ample inducement to the large capitalist to save, is scarcely any whatever to the small capitalist.

Suppose then the rate of interest fixed by law at the lowest marketable rate, as is perhaps the case at this time in Virginia, what, let me ask, will be the general effect so far as law operates efficiently? The effect of the law will be to throw the largest possible portion of the loanable capital of society into the hands of the rich, and those already established in business. The young, the enterprising, those engaged in hazardous or uncertain occupations, all those in fine who cannot give the best security, must be unsupplied, for a very plain reason—the risk of a loan to them, is greater than when made to a wealthy man, and consequently the lowest marketable rate is not sufficient to indemnify the lender, except in those cases where there is ample wealth to make the security perfect. The law by drawing too large a portion of the capital into the hands of the rich, has a tendency to make the rich, richer, and the poor, poorer. It prevents that due distribution of capital over the various occupations of society, so conducive to the morality, and prosperity of every community. That division of labor, so necessary to the rapid accumulation of wealth is checked, and all the trades of a hazardous or uncertain character, no matter how profitable in the main, are proscribed and denounced by the law.

But say the advocates of such a law, "all this is just as it should be. In the first place, when the legal coincides with the lowest market rate, a large portion of capital is drawn to the land just where it should go.—And 2dly—men who are established in business are preferred to projectors, as they certainly ought to be." I hope I shall be able to show by a very brief examination, the utter fallacy of each of these arguments. First. Land it is said yields but a low rate of profit, and consequently can afford to pay but a low rate of interest: reduce interest to the lowest market rate, and land will

command all the capital required, because it affords the very best security. To this we answer, that in almost every country the general rate of profits is determined by agricultural profits—that there are some peculiar advantages attendant on agriculture, which will always draw towards it its due share of labor and capital. In every country, from this cause, agricultural profits are near the minimum. So far then from capital, in case of perfect freedom of trade, tending with too little gravity towards agriculture, it perhaps generally, (but especially in those countries where there is a minute division of landed property, or where the right of suffrage is attached to real property alone,) tends towards this department of industry too much. Some distinguished writers are of opinion that in Ireland and France, the too minute division of landed property has drawn to the land an undue share of labor and capital, and in the course of time will produce the most lamentable consequences. At all events, there is no law required to throw into the agricultural business the capital which it requires, and the circumstance of agricultural profits being always near the minimum rate in every country, most conclusively proves this to the satisfaction of every sound political economist. The fact is, those who support the limitation of the rate of interest on this principle, must necessarily give up the free trade theory. For they can only support themselves by the assertion that capital, when left free, will not take the most advantageous direction.

Secondly. It is asserted that when the legal rate of interest approximates nearly to the lowest marketable rate of interest, prodigals and projectors are prevented from getting money to the injury of those carrying on more regular and better established trades. Adam Smith, unfortunately, has given the sanction of his great name to this argument. He says "the legal rate, it is to be observed, though it ought to be somewhat above, ought not to be much above, the lowest market rate. If the legal rate of interest in Great Britain, for example, was fixed so high as eight or ten per cent. the greater part of the money which was to be lent, would be lent to prodigals and projectors, who alone would be willing to give this high interest; sober people who will give for the use of money no more than a part of what they are likely to make by the use of it, would not venture into the competition. A great part of the capital of the country, would thus, be kept out of the hands which were most likely to make a profitable and advantageous use of it, and thrown into those which were most likely to waste and destroy it; where the legal interest on the contrary, is fixed but very little above the lowest market rate, sober people are universally preferred as borrowers, to prodigals and projectors. The person who lends money, gets nearly as much interest from the former as he dares take from the latter, and his money is much safer in the hands of the one set of people, than in those of the other. A great part of the capital of the country is thus thrown into the hands in which it is most likely to be employed with advantage." With regard to prodigals, I will content myself for the present with another quotation from Dr. Smith, which will be a sufficient answer to the above. "The number of prudent and successful undertakings (says he) is every where much greater, than that of injudicious and unsuccessful ones. After all our complaints of the frequency of bankruptcies, the un-

happy men who fall into this misfortune, make but a very small part of the whole number engaged in trade, and all other sorts of business, not much more perhaps than one in a thousand." Again "It is the highest impertinence and presumption therefore in kings and ministers, to pretend to watch over the economy of private people, and to restrain their expense, either by sumptuary laws, or by prohibiting the importation of foreign luxuries. They are themselves always and without exception the greatest spendthrifts in the society: let them look well after their own expense, and they may safely trust private people with theirs. If their own extravagance does not ruin the state, that of their subjects never will." According to Dr. Smith's own assertion then, it is the height of impertinence and absurdity in the legislator to endeavor to restrain private prodigality; why then should he defend the usury law upon this principle? Surely it must be granted, that in this case he goes against his own best established principles. I shall again advert to the case of the prodigal under another head.

With regard to projectors, I have to observe, that if according to Smith's own admission, the wasteful spendthrift forms not more than the thousandth part of society, reckless projectors form a still smaller portion, and therefore it is less necessary and more impertinent still for kings and ministers to meddle with their private concerns. "To err in the way of prodigality (says Jeremy Bentham in that inimitable and unanswerable production 'Defence of Usury') is the lot, though as you will observe not of many men, in comparison of the whole mass of mankind, yet at least of some. The stuff fit to make a prodigal of, is to be found in every ale house, and under every hedge. But even to err in the way of projecting, is the lot only of the privileged few. Prodigality, though not so common as to make any material drain from the general mass of wealth, is however too common to be regarded as a mark of distinction or singularity. But the stepping aside from any of the beaten paths of traffic is regarded as a singularity, as serving to distinguish a man from other men. When in comparison with the number of prodigals, which is too inconsiderable to deserve notice, the number of projectors of all kinds is much more inconsiderable, and when from this inconsiderable number, must be deducted the not inconsiderable proportion of successful projectors, and from the remainder again, all those who can carry on their projects without need of borrowing, think whether it be possible, that this last remainder could afford a multitude, the reducing of which, would be an object, deserving the interposition of government by its magnitude, even taking for granted, that it were an object proper in its nature." Thus even if projectors were like prodigals, unthrifty and disadvantageous to the general prosperity of the community, still their number would not be sufficient to render them a very material clog on the accumulation of wealth. But this cry against projectors is unmerited and unjust. Projectors are those who explore new channels of trade, make new applications of established principles, aim at improvement in the arts and manufactures, &c. &c., and let me ask, if these are not the very men who have given the character to the age in which we live. Your Watts, Fultons, Whitneys, Arkwrights, &c. were all projectors, and the steam boat, the

steam car, the cotton mills, power looms, and spinning machines, those miracles of the age, are the results of their inappreciable labors. It is the projector who has created the vast difference between the savage of North America and the civilized European. It is the projector who has created the almost unmeasurable fund of luxuries and comforts enjoyed by the poorest peasant of modern times, but which the emperors and kings of the ancient world were deprived of. To raise our voice against the projector is in fact to declaim against the progress of civilization. But projectors often fail entirely in their schemes, and the capital borrowed and consumed by them, is a clear loss to the community. I am willing to grant all this, and even to allow the failures to be double, triple or quadruple the instances of success: the force of our argument is so exuberant, as to allow of any number of failures short of the whole, and still be sound. There may be ninety-nine failures for example, before the discovery may be effected, but when the discovery is once made, its benefits may endure forever. Columbus was a projector. He discovered a new world which was to be the home of the pilgrim, and the asylum of the persecuted of all nations. If the whole wealth of Portugal and Spain had been sunk in this discovery, the discovery would more than have compensated the loss. Fulton was a projector: and the very day that his boat moved by the impulse of steam power on the Hudson, he gave to the world, not what would compensate alone for the failures of those engaged in the investigation of steam power, but what would more than compensate for all the failures, of all projectors, from that moment to the present time. He gave to the world that which has changed its aspect and done more for the progress of civilization and wealth, than any invention since the introduction of the art of printing.* In like manner, he who at last makes some great improvement in agriculture, opens some new channels of commerce, discovers new routes, invents new ma-

* I cannot forbear making an extract from a discourse of Judge Story, delivered before the Mechanic's Institute, Boston, in 1829. It will serve to show that the cold and withering treatment which the projector receives from the world, is amply sufficient to repress his energies within proper limits, without the aid of law. "I myself have heard (says Judge Story) the illustrious inventor of the steam boat relate in an animating and affecting manner, the history of his labors and discouragement. 'When,' says he, 'I was building my first steam boat at New York, the project was received by the public either with indifference or with contempt, as a visionary scheme. My friends indeed were civil, but they were shy; they listened with patience to my explanations, but with a settled cast of incredulity on their countenances. I felt the full force of the lamentation of the poet—

"Truths would you teach, to save a sinking land,
"All shun, none aid you, and few understand."

"The loud laugh often rose at my expense, the dry jest, the wise calculation of losses and expenditures, the dull, but endless repetition of the 'Fulton Folly:' and even when the boat moved and the experiment succeeded—"All (says he) were still incredulous: none were willing to trust the evidences of their own senses. I was the victim of disappointment. Imagination superseded the influence of fact, it was then doubted if it could be done again, or if done, it was doubted if it would be made of any great value."

chines, discovers new processes of industry, more than pays for all the failures incurred by others. "The career of art (says Bentham) the great road which receives the footsteps of projectors, may be considered as a vast, and perhaps unbounded plain, bestrewed with gulfs, such as Curtius was swallowed up in. Each requires a human victim to fall into it, ere it can close; but when it once closes, it closes to open no more, and so much of the path is safe to those who follow. What general, let him attack with ever so superior an army, but knows, that hundreds or perhaps thousands must perish at the first onset? Every man for himself, but "God," adds the proverb, (and it might have added the general and the legislator and all other public servants) "for us all." Thus do we see that the few projectors who succeed, more than compensate for the failures. I hope then I have succeeded in clearly proving that the usury laws cannot be defended on the ground that they favor those engaged in regular and old occupations, and prevent the lending of money to projectors and prodigals.

Bank interest should conform to the ordinary market rate.

But it has been asked whether banks should not be restrained in the rate of interest which may be taken? To this I answer, that as banks not only afford a considerable portion of the capital with which trade is carried on, but likewise the largest portion of the circulating medium of the country, it behoves them, on this latter account, to be governed in lending money upon somewhat different principles from private individuals. There is nothing more sensitive than a paper currency. Its value and credit depend on its ready convertibility into specie, when presented for payment. The credit of a bank is like the chastity of woman; it must not be assailed by the breath of suspicion even. Hence, a bank should not indulge a speculating spirit; all its transactions should be of the safest and surest character; its securities should be such as could be easily converted into cash, and it should never lend to doubtful or suspected persons, because the credit of the bank depending on the ready convertibility of its notes, it would be liable to be broken by a run at any time, if its debts could not be easily collected. For this reason banks ought not to lend in those cases where the risk is very great, because if they succeed the community would not be benefited, inasmuch as the profits would go to the stockholders in the shape of dividend—and if they fail, the solvency of the bank might be endangered, the value of the notes destroyed, and the currency of the country deranged. We have seen that very high interest is generally the result of the risk which is run, and not of the profits expected to be made: loans in these cases then, ought to be made by individuals, and not by banks, for the success or failure of the individual would not effect the currency like that of the bank. For these reasons, I am willing to allow a restriction of bank interest to the ordinary marketable rate, but never below this point—and I would have it to vary from time to time, with this rate. I am sorry to find that in this opinion I am forced to differ from one of the most profound and intellectual statesmen, not only of this country, but of the age in which we live—a statesman whose penetrating and perspicacious

mind seizes with the lightning's rapidity on the important and essential points of his subject, connecting them together by such a chain of close and logical reasoning, as almost to present to the mind, the full rigor of mathematical demonstration. Mr. Calhoun in the senate of the United States, while speaking on Mr. Webster's bill to prolong the charter of the United States Bank, says, "among others (limitations to be prescribed) I entirely concur in the suggestion of the gentleman from Georgia (Mr. Forsyth) of fixing the rate of interest at five per cent.; a suggestion of the very highest importance, as having a most important bearing on the value of property and the prosperity of the country, in every branch of its industry." I wish very much Mr. C. had given his reasons *in extenso*, for such a regulation. I know full well, they would have been the very best which could have been urged: without such aid, however, I cannot conjecture any good and substantial argument in favor of the reduction of bank interest, so far below the marketable rate in every portion of the union. Many of the earlier writers on political economy were in favor of a low legal rate of interest upon the supposition that the marketable rate might be regulated by loans at the banks. This is well known to proceed on the fallacious idea, that interest depends on the quantity of money, and not on the quantity of capital. If the banks for the purpose of lowering interest should make exorbitant issues, they immediately flood the country with paper, and a consequent depreciation must check the over-issue, by producing drafts on the banks for specie, or if specie payment should be suspended, then the paper money would depreciate in proportion, and even much more than in proportion to the over-issue, so that you can never by the issue of notes increase the aggregate value of the whole circulating medium. If the whole United States require a circulating medium of \$100,000,000 to perform the functions of circulation, and you increase it by the issue of an inconvertible paper money (and remember this is the only way in which you can increase it) to \$200,000,000, you will just make two dollars after the issue, to be worth what one was before, and of course 200,000,000 will be worth no more than the 100,000,000. Property it is true, of every description will rise in price, but it will be a merely nominal rise, dependent entirely on the depreciation of the currency. Even then, if interest depended on the amount of circulating medium, banks could not lower it, for the very plain reason, that the issues of banks cannot possibly increase the aggregate value of the whole circulating medium.

But you may say if bank interest is reduced to five per cent. banks will never lend, except on the very best security, and they may accommodate with safety all who can furnish such security. To this I answer, that there is no fact better ascertained in the operation of banking, than that of a possibility of over-issue even upon the best security. The moment you bring bank interest below the marketable rate of interest, every individual in reach of a bank will go to it for accommodation rather than to individuals, for the simple reason that he obtains the loan on cheaper terms. Under these circumstances, every body would be disposed to borrow of the bank, and pledge his prop-

erty for repayment. The entire property of the country stands ready to mortgage itself to the banks the moment their rate of interest falls much below the marketable rate. Mr. Ricardo says if the bank interest in England falls below the marketable rate, the bank is immediately besieged by a host of customers applying for discounts, and the clerks are all kept in the most constant and active employment. This is well known to have been particularly the case during the continental wars in Europe, when the immense loans contracted by government, together with a train of concomitant events, partly accidental, and partly growing out of the war, raised the market far above the bank interest. On the contrary, when the bank rises above the market interest, the banks have little to do, the clerks are idle, for money is borrowed from individuals where it can be gotten cheaper than from the banks. To show the impropriety of this great restriction on interest upon loans of the bank of the United States, let us take, for illustration, the state of Illinois. Parties contracting may agree for interest in this state as high as 12½ per cent.; and this is about the marketable rate. You establish here, as we will suppose, a branch bank of the United States, to lend money at 5 per cent: is it not evident that every borrower will gain 7½ per cent. by going to the bank? And consequently every one will give it preference over individuals, and the whole property of the community would be readily mortgaged for repayment. If then the bank persisted in lending in every case, the whole state would be inundated with paper; for there is no amount of money which the bank might not lend out. The bank then would be obliged to stop its issues long before all the community was accommodated: those who could not borrow from this source then, would go to individuals and pay 12½ per cent. for loans. Now I would ask if, upon any principle of justice or policy, any great monied institution ought to be required to furnish a few individuals in society with money at 5 per cent., while all other borrowers are obliged to pay 12½? Do you not by such a measure as this require of the bank to make a donation of 7½ per cent. in the capital borrowed by each individual? But, say you, the bank by lending more than a sum equal to the reserve in the vaults, may make its fair profits even at an interest of 5 per cent. Grant it; and what follows? Why that this is an argument for charging a bonus which ought to be equal to the advantage which accrues from the monopoly of banking. If each of the branches of the United States bank, were allowed to charge an interest proportioned to the market rate in each state, where located, the government might demand a bonus far beyond that which has been contracted for in the present charter, and justly demand it, for the whole community are entitled to indemnification for advantages yielded in the case of monopolies.

There are other considerations which would induce me to decide against the limitation proposed by Messrs. Calhoun and Forsyth. Our great objection to all national banks is that the power may become so great as to endanger the liberties of the country. Reduce the rate of interest to five per cent. and the power of the United States Bank will be greatly increased; I have shown the utter impossibility of such a bank lending all the capital which is demanded, even on the best security.

The bank directors then must determine, among those who apply for loans, who shall be favored and who not. They are a chosen divan, and will reject A or accept B according to their pleasure, without being obliged to give reasons for it. The farther the bank interest has been brought below the market interest, the greater will be the benefit from borrowing of the bank, the greater consequently the dependence of the trading portion of the community on the bank, and of course, the greater the power of the bank. Suppose merchants who are getting accommodation at the bank feel desirous to favor a measure which the bank may disapprove, would not the threat of the bank to stop their discounts, awe them at once into quiet submission to its will? Is it not a well known fact that when petitions are handed about in London for signatures the merchants are frequently in the habit of confessing, that they would willingly favor them, but dare not because of the hostility of the Bank of England, and the consequent danger of a stoppage of their accommodation? If all banks however lend at the same rate, and that be the market rate, then if one bank threaten you with a stoppage of accommodation, you may go to another; and if all the banks reject you, you may go to individuals, and that without any loss or injury. The independence of the borrower is thus secured, and the power of the bank kept within proper limits. Again: one great evil of all incorporations is, that they produce a concentrated ascertainable interest which always wars with great success against the unconcentrated, unascertainable and unharmonious interests which are arrayed against them. Thus taking the Bank of the United States, the interest of the stockholders, directors and debtors, is an ascertainable concentrated interest, which will always be capable of much greater energy and exertion, than can be exercised by the indefinite unconcentrated interest in opposition. Now reduce the rate of interest to five per cent., and all debtors, especially those in the west, where the market rate is so high, will feel a much greater interest in the perpetuation of the institution, than if it made loans at the market rate. Indeed, I can conceive of no plan better devised, to perpetuate and build up the power of the bank, than this limitation on interest: for the directors and stockholders will not be injured by it, inasmuch, as they will pay less bonus, and issue more, and the debtors will be indissolubly bound to the bank. The favored individuals, those who get accommodation at the bank, will ever raise their voice in favor of the institution which feeds them, even though it be done at the expense of justice and right. And recollect that their unconditional support, is apt to be much more energetic and efficient, than the hostility of those who are against it. One of the most prolific sources of error, misrule and oppression, in the world, is attributable to the energy, zeal and untiring perseverance, with which particular concentrated interests war upon the general interests of the community. It is for this reason, that banks, tariffs, armies, navies, and all incorporated interests, are so hard to put down, when once they have been established.

Again, Mr. Calhoun in his late beautiful and philosophical speech on the currency, in which he has eminently displayed that admirable power so characteristic of his superior mind, the power of abstraction and generalization, has shown most

conclusively the general tendency of the banking system to over-issue, and a consequent constant proclivity to a mere paper system. Now let me ask, would not the restriction of the Bank of the United States to five per cent. interest, create a necessity on the part of the whole establishment, to issue much more paper, than if the mother bank and each branch were permitted at once to take the market rate in the several states where they are established? Most undoubtedly it would. We must recollect too, that the embarrassments of the United States Bank are apt to be occasioned by causes of a very peculiar character, which causes will always be much stimulated and aggravated by any general tendency in the whole institution to an over-issue. The branches in the south and west, where five per cent. is much below the market rate, can issue any amount of paper. This paper answers in the stead of gold and silver. It is carried down, as soon as emitted, to the great commercial cities, New York, Philadelphia, and Baltimore, to purchase goods, never to be returned upon the branch banks, unless sent there by the banks in those commercial cities after having cashed them. If the banks however in those cities refuse to take the branch notes, as they were obliged to do when Mr. Cheves was first elevated to the presidency of the institution, and they are suddenly returned upon the branch banks, then those banks must instantly curtail their issues, and call in their debts; the state banks which have been issuing their notes to supply the local circulation, find themselves immediately at the mercy of the branch of the United States Bank, and the explosion of the system, or at least a disastrous derangement of the currency, is the inevitable consequence. Did not the embarrassment of the United States Bank in 1818 and 1819 proceed from this very cause? The southern and western branches over-issued, and the notes were taken at once to Philadelphia, New York, and Boston, to purchase goods. "The result was (says Mr. Cheves) that the bank and the great northern offices were drained of their capital; and on the 20th of July 1818, only eighteen months after the institution began its operations, it was obliged to commence a rapid and heavy curtailment of the business of the bank, and its offices. During all this time, the bank had the advantage of immense government deposits." Again, in the same report he says, "the specie in the vaults (of the mother bank in Philadelphia) at the close of the day, on the first of April 1819, was only \$126,000 28, and the bank owed to the city banks, deducting balances due to it, an aggregate balance of \$79,125 99". The New York office was little better, and the office at Boston a great deal worse. The bank was only saved by the transmission of specie from the west, and the rapid curtailment of issues at all the branch banks, particularly in the west, together with a determination on the part of the mother bank and branches in New York, Boston, &c. not to cash other branch notes than those issued at their own offices. Then came the sudden and inevitable ruin of the banks of the west, the total derangement of their currency, and the forced and ruinous sale of half the real property in that country, to satisfy the claims of the banks. But enough of this sad and melancholy picture. It must I think, be evident, that marketable interest on bank loans in the west, would cause the branches to is-

sue much less than they would when making only five per cent.; there would be less tendency to speculation, which over issues always produce; and consequently, not such distressing draughts upon the great eastern states, always followed by dreadful reaction on the west.

The last argument which I shall mention in favor of making bank interest conform to the marketable, is, that whenever bank interest is very low, a bank fever is instantly generated in the country. Every section, every little village, immediately comes forward for a bank; all are eager for the boon. When was the banking mania greatest in England? Precisely at the time when the bank interest was farthest below market interest—from 1795 to the termination of the continental wars. Market interest was, during the time, ranging from five to fifteen per cent., while bank interest was only five. Look to our own country, and you will find that whenever bank interest gets below the market, an instantaneous bank fever is the consequence. At this moment, bank interest is too low every where; and every where do we hear of new incorporations, and numberless applications for banks—and this produces an almost irresistible tendency to a mere paper system. I hope then I have shown the policy of making bank interest conform to the marketable rate in every quarter where banks are established. With regard to the Bank of the United States, a question perhaps might arise, as to the propriety of indemnifying the western states, where the interest would be highest; but this is not a question for me to discuss.

Effect of the Usury Laws during money pressures.

I will now proceed to examine into the peculiar operation of the usury laws in those seasons of distrust and commercial embarrassment, when there is great pressure in the money market. My limits at present will not allow me to enter fully into this subject, and point out in detail the causes which produce these pressures: I can therefore give but a hasty and imperfect sketch of the general causes, and point out the pernicious influence of the usury laws. In almost every country, particularly a highly commercial one, circumstances are constantly occurring to give an impulse to prices, either upwards or downwards; and accordingly as they are moving in the one direction, or the other, so will the spirit of speculation be fostered,* or checked. When prices are rising, all are on the alert: the energies of man are drawn forth, his hopes which ever have an undue influence, are thrown into full play, and the imagination spreads the most enchanting schemes and projects before him; he is disposed to rush into business, or to get possession of property, whose enhancement in value from the rising tide of general prosperity is alone expected to make him wealthy. In such a condition of things, the credit system will be pushed to the extreme limits. The borrower wants money to purchase, or enter into business with, and as property and business are improving, the lender is not so scrupulous about security. He lends upon moderate security because he believes the improvement of prices will soon render it very ample. Buying and selling too under those circumstances will generally be on credit as extended as possible. By and by, prices attain their maximum—there is a pause for a few weeks be-

fore the decline commences; then follows a state of things precisely the reverse of what I have just described. Every body wishes to sell, to avert the ruin which will arise from a farther fall of prices—few are disposed to buy—the reaction, after the great extension of credit, must of course ruin the most adventurous. In this time of uncertainty and alarm, the money lender shrinks from the market; what was good security a short time previous is not so now; hence he is disposed to withhold his money from the market. Purchases and sales become now a cash business, for the universal destruction of confidence puts an end at once to the credit system. This increases the embarrassments of the nation still farther, and prevents that wholesome and rapid circulation of capital from place to place, and hand to hand, so essential to the prosperity of every country. Now let us ask, what are the chief causes of the advance or decline of prices and the consequent stimulus to speculation on the one hand, or ruinous stagnation of trade on the other? A deficiency at one time in all the necessaries of life, would of course give this upward impulse to prices; but such a general deficiency does not often occur. A partial deficiency will have the same tendency, though not to the same extent. "Thus (says Mr. Tooke) a scarcity of agricultural produce, which would, under a fixed amount of currency, advance the money prices in a ratio more or less beyond the mere proportion of deficiency, is the occasion of an actual increase in the amount of the circulating medium, which increase is again, while progressive, the occasion of accelerating the rate and extending the range in the rise of prices." A deficiency of cotton, wool and sugar, would produce, though not perhaps to the same extent, the same spirit of speculation and enhancement of prices. We have all heard of the great but ruinous speculations in sugar at the commencement of the last war, when the West India supply was expected to fail. Another cause for the extension of credit and the generation of the spirit of speculation is the opening of new markets, or the extension of old ones. The hopes of man in this case are sure to have an undue influence on him. The merchant and manufacturer rush with their capital to supply this new demand, and they are sure in the end to find that they have overrated it, and a revulsion soon takes place with all the evils consequent on declining prices. We have all become acquainted with the immense influence exercised on prices in this country by the continental wars of Napoleon, and the awful revulsion consequent on a return to a state of peace. The unwise interference of government with labor and capital as I have shown elsewhere* has a tendency to produce a singular effect. Government for example determines to foster and protect certain manufactures. This very circumstance instantly entices into the business a large portion of labor and capital, for the purpose of realizing the high profits which increased prices are to yield. This produces an over-supply of manufactures, and a speedy reaction, with ruinous decline of prices. This was witnessed in New England immediately after the tariff of 1828, where it was supposed at least \$25,000,000 worth of capital was

* Lectures on Restrictive System.

sunk by unprofitable manufacturing establishments.

Let us now examine for a moment into the effect which a rise or fall in prices may produce on the circulating medium of a country, and how this reacts again on prices. First then, I will premise what I consider an axiom on this subject: *that the efficiency of a circulating medium depends on the compound ratio of its quantity and velocity of circulation.* If \$100 change hands but once during a month, it has effected no more in the way of exchanges than \$10 which have passed through ten hands and effected ten changes. In considering the nature of a circulating medium, our statesmen are led into great errors by confining their attention too exclusively to bank paper and the metallic circulation. Every thing in fact which performs the functions of currency in society ought to be regarded as a component of the circulating medium. Money performs the functions of circulation most perfectly, because it represents value, but bears no interest during its detention in our hands: Bonds, promissory notes, bills of exchange and stocks of all descriptions, are far inferior to money in performing the functions of circulation. For, *first*, they bear interest, and the holder is in no hurry to part with them—and when they are transferred to another, interest is to be calculated on them; then they are to be discounted, and the amount of discount depending on so many fluctuating causes, the value of such paper becomes very fluctuating and uncertain. Hence it has a very sluggish circulation; but so far as it does circulate, it most undoubtedly supplies the place of money. If I buy a tract of land for \$10,000 and pay in bonds, the bonds have undoubtedly *pro hac vice* at least answered in the stead of money. "Liverpool and Manchester" says Thornton, "effect the whole of their larger mercantile payments, not by country bank notes, of which none are issued by the banks of those places, but by bills of one or two months date, drawn on London." In the great manufacturing county of Lancashire "says Mr. McCulloch," and in part of Yorkshire; a bill on London at *three months* is reckoned a money payment; * and by far the largest proportion of the currency consists either of bills of bankers drawn on their correspondents, or of those of the merchants and dealers scattered up and down the country. The same practice is followed, though to a less extent, in other districts; so that the aggregate amount of such bills afloat is enormous." Mr. Wade has estimated the bills of exchange alone in Great Britain as equal to ten times the amount of the money in the country. In our country the proportion is not so great; but bills constitute here a very large portion of our currency. "The amount

* A bill of this character, when passed from one to another is endorsed, and each endorser is held responsible for the solidity of the bill. The number of endorsements therefore shows pretty accurately the circulation through which the bill has passed. We would be astonished at the circulation of small bills of exchange in Lancashire. When Mr. Lloyd, the principal partner in the opulent house of Jones, Lloyd & Co. was asked by a committee of the House of Commons whether he had not seen bills of exchange of £10 value with fifty or sixty names upon them? Answered, "Yes! with twice that number. I have seen slips of paper attached to a bill as long as a sheet of paper could go, and when that was filled, another attached to that!"

of domestic bills of exchange" says Mr. Binney purchased in all parts of the union in 1832 (by the United States Bank alone) was \$67,516,673, "the half year from December 1832, to June 1833, was \$41,312,982, showing a large increase in that time." The amount of domestic bills in 1832 collected by the United States Bank for others, was \$42,096,062. And thus we find that the bills purchased and collected by the United States bank alone in 1832, amounts to more than \$100,000,000; equal to all the paper money and specie in circulation.

Having now explained my opinion as to the components of a circulating medium, I will proceed to show how it is influenced by a rise in prices, and a spirit of speculation. As prices advance, we have already seen that credit will be enlarged. The farmer in buying land, gives his bond instead of money. The retail merchant not only buys goods to the amount of his capital, but buys to as great an extent as he can get credit. At the same time "the exporting merchant, says Tookey, gives his acceptance to the manufacturer for the utmost amount which the latter will grant him credit for; the manufacturer at the same time having cleared his hands of finished work, buys an additional quantity of the raw material, not only sufficient to replace, but probably to extend his stock, and possibly his buildings, machinery, &c. For these purposes he gives his acceptance as far as his own credit is available, and may further discount the acceptances which he has received, thus converting the credit of his customer conjointly with his own, into the means of obtaining the temporary command of capital beyond what his own property or credit would afford him;" and thus it is, that bonds, promissory notes, bills of exchange, &c., are greatly multiplied by the enhancement of prices and a spirit of speculation in the community. Again—the bank issues on such occasions are very apt to be excessive. The spirit of speculation, and the rise of prices, produce a disposition to borrow from the banks, and the banks are disposed to accommodate on such occasions, for the very same reasons that individuals are. This produces a redundant currency, which at first increases the spirit of speculation, and enhances prices until there is a return of the notes on the banks for specie to send abroad; at this point the banks must cease to issue more under the penalty of being drained of their specie.*

* It will be perceived that I have made the over-issue of the banks to be rather the effect than the cause of a rise in prices and a spirit of speculation. I believe, in the great majority of cases, this will be found to be the fact. The banking system however, although first stimulated by the rise in prices to over-issue, immediately becomes in turn a powerfully operating cause, carrying up prices still higher, and increasing the speculative mania, by the facilities it offers in the money market. I have no doubt but that a bank like that of the United States, or the Bank of England, *might of itself*, generate this tendency, without the intervention of causes which have been mentioned above, and this is one serious objection to such banks. For some able views on this subject, I must refer to the work of Mr. Gouge, which would have supplied a desideratum in this country, if he had only given a fair and full statement of all the causes which generated the several money crises which have occurred in this country, all of which he has however, with too much *ex parte* ingenuity referred to the operations of the

It is just at this point that universal confidence has completely overstrained the whole credit system. Credit every where is substituted for cash among individuals, and the banks are making the largest possible issues with the smallest possible reserve of specie in the vaults. The circulation too becomes much more rapid, and a consequent prodigious economy in the use of money is the result. When confidence for example, is universal, debits and credits are compared together, and the balance alone paid in cash. Thus A may owe B—B owe C—C owe D, and so on through the alphabet—and Z perhaps may stand indebted to A. Now when confidence is perfect, and all are apparently moving forward in the full tide of prosperity, their accounts will be compared together, B will transfer his claim on A, to his creditor C; C to D, D to E, and so on through the alphabet, until it reaches Z, who we suppose, stands indebted to A in the same amount. All these twenty-five transactions then would be settled at once, without the passage of a *single dollar*, merely by balancing debits and credits: and at all times when confidence was general, cash would be required only for the balance due, after comparing the debits and credits together. This is found to be actually the practice in London. "In order to economise the use of money" says Mr. McCulloch "the principal bankers of the metropolis are in the habit of sending a clerk each day to the *clearing house* in Lombard street, who carries with him the various bills in the possession of those bankers, which are drawn upon his constituents; the balance on the one side or other, is then paid in cash, or Bank of England paper. By this admirable contrivance, the bankers of London are enabled to settle transactions to the amount of several millions a day, by the intervention of not more, on an average, than from £200,000 to £300,000 of cash or bank notes." The exchanges, says Mr. Gallatin in the report of the Union Committee, effected daily in the city of New York alone, amount in all to \$5,000,000 rising to 15,000,000 per year; payments are made and exchanges effected here, no doubt, upon principles similar to those upon which the London bankers economise money. Thus do we see that in seasons of apparent prosperity, when the spirit of speculation is afloat, confidence actually stands instead of money. On such occasions we may well say with Mr. Wade, "by the use of bills of exchange, bills of lading, checks, scrip, notes, clearing houses, and a variety of other contrivances, aided by a vast fabric of credit taken and given in open account, money (in its common acceptance) hardly ever enters into mercantile affairs;

banking system; thus taking the effect in many cases for the cause. The fact is, these money pressures occur frequently in countries which have a purely metallic currency. Thus in Hamburg, there are no banks; yet in 1799 there was in Hamburg, a money pressure, accompanied with a fearful list of bankruptcies, and a rate of interest ranging up to 15 per cent. There are no bank notes in circulation in Lancashire in England. Bills of exchange form more than nine-tenths of the currency there, and yet no district in England has suffered more by money pressures. There are so many ways in which credit may be extended without the agency of banks, that I am sometimes disposed to doubt whether these money pressures would not take place to almost an equal extent without them.

it is the substance really meant and shadowed forth; but it rarely, as one may say bodily, passes from merchant to merchant; the business of the mercantile classes being reduced, by a wonderful system of balancing payments, to little more than a game at chess, or the working in their counting houses of an algebraic equation consisting of the debit and credit side of each account, and communicating the result to their agents, customers and correspondents, in every part of the globe." Now supposing the whole circulating medium to remain the same, it is evident that a sudden shock given to public confidence, will retard the velocity of circulation, and produce a money pressure at once. This we have lately seen fully exemplified in our own country since the rash removal of the deposits. Our present pressure is not occasioned by a diminution of bank paper as some have imagined, for very little, if any diminution has taken place; it is owing to the diminished velocity of the circulation. So soon as you destroy confidence, credit no longer serves for cash; A stands indebted to B, who will not take debts due to A in payment as before: dealing becomes isolated*—debts and credits are no longer compared, and the balance struck. The daily transactions to the amount of millions in London and New York, cannot, under these circumstances, be settled by a few hundred thousand pounds or dollars. More cash is required than before. Just at this time the merchant seeing the storm that is gathering around him, must keep more idle money about him to meet his occasional demands—every debtor must do the same. This produces a much greater abstraction from the currency than is generally imagined. Now what is the effect of the usury laws in such a crisis as this? Most evidently, to increase the pressure. Men who have capital to lend in this season of alarm and uncertainty, will not venture forth with it, because legal interest will not cover the risk. They hoard, therefore, rather than jeopard their capital, and thus it is, at a time when there is the greatest demand for capital, the usury laws cause it to disappear, and thus add to the calamities of the times. It is said, during the late commercial distress in New York, the deposits were very great in the most secure banks. In such times as these, only permit individuals to take a fair rate of interest for the risk incurred, and all the capital of society will immediately be drawn into active use. You may say indeed, that many will be ruined by the high rate of interest at which they borrow capital. Grant it—but would not that ruin equally and more certainly follow, by forced sales of their property? And recollect, that the loss incurred by a forced sale can

* As a proof of the truth of the doctrine here advanced, I would advert to the two great money pressures in England in 1793 and 1810 and 11. In both cases government determined to issue exchequer bills, and it seems that the mere determination of the government was sufficient to restore confidence and remove the pressure before the bills were issued. I have no doubt but that the plan of Governor Marcy, in New York, to create \$6,000,000 of stock, to be lent out in the state will, if it has not already done it, relieve the pressure in New York. I would not however for a moment be supposed capable of applauding such an immoral scheme: a scheme which proposes to make the state responsible for the acts and misconduct of banks and politicians.

never be remedied, whereas exorbitant interest may be gotten rid of, by borrowing at a cheaper rate from other quarters. Moreover, whether the individuals borrowing are eventually ruined or not, much will, most undoubtedly, be done to relieve the distress, by thus throwing the capital into circulation. We have just seen how the circulating medium is economised in times of general confidence and fancied security, by the substitution of credit for cash. Now in times of great pecuniary pressure, every single portion of property brought into the market by the pressure, increases the demand for a circulating medium, because every such case is a new exchange of property requiring money to effect it, which will be of course prevented, if money can be borrowed before the property is brought under the hammer.

So far, I have been arguing against the usury laws upon the ground of the evils which they produce in case of their efficient operation. But I believe all history has satisfactorily proved that the usury laws will ever be broken or evaded, in spite of the law, or the judge. If the marketable rate of interest rises beyond the legal, the lender of money then labors under a strong temptation to violate the law. Suppose that he does it openly, what is the consequence? Why, in the first place, the risk which the law occasions becomes a new element in the calculation, and he must exact higher interest to indemnify him against it. In the second place, there is an ignominy incurred by violating the law of his country, and he must charge on this account likewise, for no man will incur ignominy and degradation without being well paid for it. Thirdly—the honest conscientious and scrupulous capitalists either withdraw their capital altogether from the market, because of the insufficiency of the legal rate of interest, or use it themselves. This leaves the money market entirely in the hands of the unscrupulous and unmerciful money lender, who in the absence of regular competition, is enabled to charge a much higher interest on his loans. For these three reasons it is, that laws restraining the rate of interest operate most oppressively on the needy borrower, by actually raising interest instead of lowering it. We have already seen to what an enormous height the usury laws raised interest in Rome. Montesquieu says, interest in the city was 34 per cent., in the provinces 48 per cent. Brutus lent money at 45 per cent. in Cyprus. And we have seen too to what a height interest has risen in all Mahomedan countries, for the same reason, it being in those countries ten or twenty times higher than in Europe, in consequence of the risk created by the laws themselves. During the middle ages, interest was generally prohibited altogether, or much restricted: and what was the result? Why, the Jews, who were the great money lenders of Europe, were in the habit of lending money (says Chief Justice Hale) at 40 per cent., and sometimes as high as 50 or 100. In 1215 Edward I. under the impulse of the most misguided political views and fanatical zeal, confiscated the property of the Jews in England, and banished them from the country. Fifteen thousand were thus robbed and driven into exile—and what says the historian of the result? Why, that lending and borrowing must take place in every country, and that so soon as the Jews were driven away, the practice of usury was exercised by the English themselves, and the Lom-

bards, to even a greater extent than by the Jews. Henry VII. one of the most vigilant penetrating monarchs that ever sat on the British throne, enacted laws not only against interest, but against all profits on bills of exchange; and the historian tells us, that with all his vigilance and energy he could not secure the execution of the law. In the reign of Henry VIII. ten per cent. interest was allowed, and corresponded nearly with the market rate; but in the reign of his son, the prohibition was revived, and continued during the reign of the bigotted and persecuting Mary; and the effect was a rise of interest to 14 per cent. Coming nearer to our own times, we find that the rate of interest was fixed in France as early as 1665 at five per cent. In 1766 the law reduced it from five to four. Instead however (says Storch) of reducing the market rate from five to four, it was raised to six, an additional per cent. being required to cover the risk of illegality; and this very wisely produced a repeal of the measure. Again, in 1786 the Empress Catherine reduced the legal rate of interest from six to five in Livonia. Hitherto, says Storch, those who had good security to offer were enabled to borrow at six per cent. but henceforth they had to pay seven per cent. and upwards. Many other instances might be adduced, but it is not at all necessary to cite a greater number, to prove what every man who is acquainted with the principles of political economy must readily admit.

In every country where usury laws exist, so soon as the market rate rises above the legal, besides the direct and positive infringements of the law which have just been considered, numerous devices are had recourse to, for the purpose of defeating and evading its operation; and in spite of the assertion of Lord Mansfield that, "when the real truth is a loan of money, the wit of man cannot find a shift to take it out of the statute," these evasions do very frequently succeed in defeating the law. The usury laws are certainly penal statutes, and according to a rule of interpretation acknowledged by all jurists, ought to be construed strictly. In England, those laws have been executed with as much rigor as perhaps in any other country; and yet all the writers agree that they are very frequently and successfully evaded. They have given rise in that country to a species of gambling in annuities of the most pernicious character. The following resolution appears in a very able report made by a committee of the House of Commons on the usury laws in 1818. "It is the opinion of this committee that the laws regulating or restraining the rate of interest have been extensively evaded, and have failed of the effect of imposing a maximum on such rate; and that of late years, from the constant excess of the market rate of interest above the legal, they have added to the expense incurred by borrowers on real security, and that such borrowers have been compelled to resort to the mode of granting annuities on lives, a mode which has been made a cover for obtaining a higher rate of interest than the rate limited by law, and has further subjected the borrowers to enormous charges, or forced them to make very disadvantageous sales of their estates." The method resorted to in France for the purpose of evading the usury laws, is simply to give a bonus before completing the transaction, or which is the same thing, to frame the obligation for a larger sum than was actually advanced by the

lender. None of the parties interested, can be called in to swear to the fact of such a bonus being given: unless therefore some third disinterested party was privy to the transaction, it remains unimpeachable. In Russia, the usury laws are constantly and successfully evaded. The rate fixed by law is I believe five per cent.; "many people" says Jeremy Bentham "lend money, and no body at that rate; the lowest ordinary rate upon the very best real security is eight per cent., nine per cent. and even ten, upon such security are common. The contract is renewed from year to year. For a thousand roubles, the borrower in his written contract obliges himself to pay at the end of the year, one thousand and fifty. Before witnesses he receives his thousand roubles: and without [a witness] he immediately pays back his thirty roubles or whatever the sum may be, that is necessary to bring the real rate of interest to the rate verbally agreed on."

In the state of Virginia, the most common mode of evading the usury laws, is by purchase of bonds. The Court of Appeals have decided, that the purchase of bonds at discount, does not come within the pale of the law. Now suppose, A wishes to borrow \$1000 of B, but he knows B will not lend at six per cent. He executes a bond, entirely fictitious to C, which C immediately sells to B at six per cent. discount; B pays C only \$940 which is handed over to A, and B knows nothing, or at least legally knows nothing, of the fictitious character of the bond, and consequently cannot be responsible under the usury laws. Another mode of evading those laws, is by drawing and redrawing bills of exchange, and selling them at discount.

But you may ask if these laws are so successfully evaded, why should a clamor be raised against them, as they must be harmless on our own principles. To this I answer, that many money holders are precluded by occupation and other circumstances, from being enabled to practice these devices; and again, public opinion always brands them with some degree of ignominy, which drives a large portion of the scrupulous and conscientious from the business, and leaves it consequently in the hands of those who, taking advantage of the monopoly which they enjoy, exact a much higher interest virtually, than if allowed to lend their money directly, without being forced by the law to practice a fraud. Thus, in England the method of borrowing by selling annuities, always enhances the interest actually paid. "The laws against usury" says Mr. Holland, partner of the house of Baring, Brothers & Co. and one of the best informed merchants in the country, says Mr. McCulloch, "drives men in distress, or in want of money, to much more disastrous modes of raising it, than they would adopt if no usury laws existed. The land owner requires capital to increase his live stock, or improve his lands, or for any other purpose, at a period when the government is borrowing money at above five per cent.; no one will then lend to the land owner, because his money is worth more to him than the law allows. The land owner must therefore either give up his improvements, or borrow money on annuity interest, on much more disadvantageous terms than he would have done, if no law existed against usury." Mr. Sugden on being asked by a committee of the House of Commons, if whether there were no usury laws, better terms could be obtained by the borrower

than those which he gets by borrowing on annuity interest, answered, "I am decidedly of opinion, that *better terms* could have been obtained; for there is a stigma which attaches to men who lend money upon annuities, that drives all respectable men out of the market. Some leading men did latterly embark in such transactions; but I never knew a man of reputation in my own profession (law) lend money in such a manner, although we have the best means of ascertaining the safest security, and of obtaining the best terms." Unfortunately, in our own state, public opinion is decidedly opposed to the business of purchasing bonds; and the consequence is, that comparatively little capital is employed in this manner, and the business being thus thrown into the hands of a few, gives them a monopoly of the market and the power of dictating their own terms, especially in times of pressure and alarm. The very best paper in New York has been discounted during the present pressure, at two, and two and a half per cent. per month; and such has been the embarrassment in the money market, that persons have borrowed, as has frequently been the case in such times in London, for twenty-four hours only, at the enormous interest of one per cent. per diem. I have no hesitation then in declaring it as my honest conviction, that the usury laws injure that very class in whose defence they are enacted, and foster and pamper the very class against whom they are intended to operate. The unscrupulous heartless "shaver" is the man who reaps the greatest advantage from their operation. He is in fact most interested in their continuance.

Thus do we see that the usury laws in every country will be either directly broken, or artfully evaded. That in both cases, instead of lowering interest below the market rate, they actually raise it much higher than it would reach without those laws, and thus injure the honest scrupulous money lender on the one side, who is unwilling to violate or even evade the laws of his country, while they on the other hand, oppress the borrower by actually raising the interest of money far beyond the point it would reach, without the artificial risk created by the law, and the stigma attached to all those transactions, by public opinion.

Moral influence of the Usury Laws.

Let us now contemplate these laws for a moment, in relation to their influence on the moral condition of society. All law should spring naturally from the relations of society, and be of such a character as to command the sympathy of the community in favor of its execution, and not against it: all law should be based on natural justice as far as possible, and should be of such a character as will secure the perfect obedience of the members of the body politic. This will ensure always the *reign of the law* which is the vitality of genuine republicanism. Now what is the character of the usury laws? They are evidently an infringement of the rights of a certain species of capitalists; they hold out the greatest temptation to a violation of the laws; they administer to the very worst passions of our nature, *avarice, ingratitude, revenge*; they sacrifice the honest man, and pamper and feed the dishonest and unscrupulous. They engender hypocrisy, cunning and false dealing on the one side, and treachery and dishonesty on the other. They are

shares unwisely laid by the legislature to undermine and destroy the characters of both borrower and lender. He who violates or evades the usury laws suffers in character, and he who pleads them in bar of the payment of his debt, is pointed at with the finger of scorn. How unwise is the law which holds out a temptation to the borrower to become informer and prosecutor for the penalties, and thus to reap iniquitous advantage from a transaction to which he was a willing, and perhaps a benefited party. Mr. Hay in 1817 in one of the ablest and most philosophical speeches ever delivered in the legislature of Virginia, justly says in relation to our usury laws "much, sir, as we from habit venerate the law in the abstract, its practical operation has been always odious. Sir, I have seen a borrower retire from the supreme tribunal with a decision in his favor. The instinctive horror of the by-standers has opened a lane for him to pass as if they feared contamination from his touch. These laws, are calculated to harden the heart of man; they offer him a premium for unkindness."

The disrepute into which the money lenders have fallen in most countries, is owing chiefly to the usury laws. Their rights have been violated by the law, and they have been almost forced to give up their straight forward honest character, for one of cunning and evasion. Repeal those laws, let the capital of the scrupulous be brought into the money market, and immediately you will secure amelioration of character in the money lender, and interest will rather be lowered than raised. I am not dealing in vain conjecture; we have facts to prove our assertion. "The case of Holland" says Mr. McCulloch, "furnishes a practical and striking proof of the correctness of the theory. It is an undoubted fact that the rate of interest has been for a very long period, lower in Holland, than in any other country in Europe, and yet Holland is the only country where usury laws are altogether unknown, where capitalists are allowed to demand, and borrowers to pay, any rate of interest. Notwithstanding all the violent changes of the government and the extraordinary derangement of her financial concerns in the course of the last twenty years, the rate of interest in Holland has continued comparatively steady. During the whole of that period, persons who could offer unexceptionable security, have been able to borrow money at from three to five and a half per cent.; nor has the average rate of interest charged on capital advanced on the worst species of security, ever exceeded six or seven per cent., except when the government was negotiating a forced loan. But in this country, where the law declares that no more than five per cent. shall be taken, the rate of interest for capital advanced on the best landed security has in the same period, varied from five to 16 or 17 per cent., or five times as much as in Holland. Surely this ought to put to rest all doubts as to the inefficacy of the usury laws." In France the usury laws were abolished at the revolution, and Storch says the abolition was attended with no rise of interest. "In Hamburg, (says the report of the House of Commons above alluded to) the rate of interest is quite unrestricted; or if there be a written law restraining it, it has become altogether obsolete. The rate therefore varies according to circumstances: occasionally it has been at seven, eight and even ten per cent., and in 1799, a period

of great mercantile embarrassment and insecurity, it was as high as 14 per cent.: generally however, the rate of discount on good bills does not exceed four or five per cent."

In New York the rate of interest is seven per cent., but I believe loans might easily have been negotiated before the present money pressure, on good security, for six per cent., and even less. In South Carolina the legal rate is seven per cent., but the marketable rate, says Dr. Cooper, is only six. We need never fear then that the rate of interest, when left free, will become exorbitant. It is bound over by laws as certain and unerring in their operation as those which govern the prices and hires of any other species of property in the community.

Compound Interest.

Before leaving this branch of my subject, I will say a few words on the subject of *compound interest*, or receiving interest on interest, as soon as it is due. This kind of interest is universally condemned in all countries: principally because of the rapidity with which it accumulates, and the severity with which it would operate on the debtor. Now I cannot possibly see the justice of those laws against compound interest, in all cases. I can well imagine that honest persons may be engaged in law suits which may require years to carry them through the labyrinthic mazes of a chancery court, and in such cases, I am very willing to allow that compound interest ought not to be granted: but in all cases where the obligation is an acknowledged one by the debtor, and he fails to pay interest when due, I can see no reason, and I believe ingenuity cannot point out one, why the debtor should not pay interest on the interest which was due. The law in this case, violates the principle of all good law—that no one should be allowed to take advantage of his own wrong. If the debtor, by fraud and stratagem, can evade the payment of interest, he gains by it—and the creditor is made to loose by his kindness and indulgence. There is surely no principle of justice which can sanction the law against compound interest. If the interest is paid up when due, the creditor can lend it out again, and thus make compound interest. If the debtor withhold it, then it is nothing but justice that he should pay interest on it, as it has certainly become principal. Thus says Jeremy Bentham, "the cause of him whose contention is to *catch a gain*, is preferred to that of him whose contention is to avoid a loss; contrary to the reasonable and useful maxim of that branch of the common law which has acquired the name of equity. The gain which the law in its tenderness thus bestows on the defaulter, is an encouragement, a reward, which it holds out for breach of faith, for iniquity, for indolence, for negligence."

III. Arguments used in favor of the Usury Laws.

I will now advert to some of the principle arguments urged in favor of the usury laws, and as their refutation is generally involved in the preceding reasoning, I shall be very brief. One very popular argument in favor of these laws is, *that they have either a tendency to check prodigality, by preventing the prodigal from getting money at all, or if he succeeds, they prevent his ruin by forbidding high interest.* In answer to this it has been justly urged, that either the prodigal has property, or he has none. If he has property he can give good

security, and consequently can borrow money at as cheap a rate as any one. In fact there is great advantage in lending money to a prodigal on good security; for his career will soon bring his property into the market and the lender who has a lien on it will generally be enabled to get it at his own price. This fact is well known to all speculators in the money market. Suppose however that no one will lend to the prodigal, because of the restraint of the usury laws. Do you think thereby to prevent his spending his patrimony? Certainly not. He will get from tradesmen that credit which the law will not allow him to get from the money lender. Suppose he goes to the merchant and buys goods worth \$100, but is charged by the merchant \$133; does he not virtually borrow in this case at the enormous rate of 33 per cent.? He may buy of the horse jockey for \$150 on credit, a horse worth but \$100 cash. In this case he will give 50 per cent. Now I maintain, and I believe the proposition susceptible of demonstration, that it is infinitely better to throw the prodigal into the hands of the money lender, than of the various tradesmen of the community; for in the first place, money lending is his business, and like all regular dealers, he can do this business upon cheaper and more advantageous terms to the borrower, than he could who does not carry it on regularly. The dealer of whom the prodigal should purchase \$100 worth of goods, would think an advance of 33½ per cent on account of credit given, a mere trifle: a regular money lender would never think of exacting such exorbitant interest. In the second place, public opinion acts with more force against the exactions of the money lender than against those of any other class of dealers. The sales of the merchant, tailor, horse dealer, &c. may be kept secret, or if known cannot be properly judged of, in consequence of the variable prices of the articles disposed of: but the money lender must record his securities, the transaction thus gets publicity: money, as I have before said, is an article of commerce whose agency and value are well understood, and a too exorbitant rate of interest would be sure to brand the money lender with a considerable degree of infamy: the money lender therefore is in most cases the fittest person to obtain credit from. Suppose however the prodigal has no property? Then it is a matter of very little consequence whether he fall into the hands of the *shaver* or not: where there is no fleece there can be no shearing. The money lender will consent to lend, in all probability, in such a case at no interest whatever. Prodigals in this condition most generally borrow of friends (small sums from each) who make up their minds to lose what they lend, and therefore take no interest at all, or only the legal. Such loans partake principally of the nature of gifts, and therefore have but little to do with the subject under discussion. Thus do we see that even on the very principles of those who contend for the usury laws, they cannot check or diminish prodigality in the slightest degree; but on the contrary, exert a most pernicious influence against the prodigal. But why, let me ask, all this solicitude—all this guardian care of the public for the prodigal and his interests? Is he the most important member of society? You answer, no—in almost every point of view, he is one of the least worthy. Is there a universal proclivity in the human family to profligacy and prodigality? No not one in twenty is a prodigal. Can it then

be just and expedient, even if the usury laws checked prodigality (which they certainly do not,) to impose restriction on the holders of money throughout the nation, thereby violating every principle of equity, running counter to the great and harmonious system of free trade and the regulating laws of supply and demand, for the benefit of the least worthy and the least numerous class of society? Surely not.

Again, it has been urged that these laws *protect the necessitous, the indigent, the simple, &c.* I must refer to what has already been said as a sufficient refutation of such arguments, with the additional remark, that we do not assert that cases may not occur where borrowing on interest may ruin the individual. All we assert is, that borrowing money is generally better than other species of credit, which may be obtained—that if under peculiar circumstances the money lender has it sometimes in his power to oppress, and take undue advantage of the necessities of others, in other trades men do the same things, to a much greater extent. We are not near so liable to imposition in borrowing money, as in many other transactions. I have known a man who had taken a *peculiar* fancy to a horse, to give \$500 for him, when no man, not even the owner, could value him at more than \$150. Is this undue advantage taken by the owner any reason why the legislature should regulate the price of horses? I have known a man to be obliged to pay five times the value of a jewel which was associated with his fondest recollections, merely because the owner knew his attachment to it, and took advantage of it. Is this any reason, to bring in a law to fix the price of jewelry? Certainly not: and yet it would be just as reasonable, as to defend the usury laws for the purpose of protecting the necessitous, the simple, &c. And besides all this, the law can never attain its end. You may suppose it efficient in one direction, but equally bad and even worse consequences will flow from some other quarter. You had as well expect to defend Virginia from the incursions of her future enemies, by building a chain of forts around the mouth of the Piank-tank alone, as to think of putting an end to prodigality, and of protecting the indigent, the necessitous, the simple, &c., by saying they should not borrow money at more than six per cent. Worse than useless are the vain attempts of the legislator to stop the floodgates through which the wealth of the prodigal and imprudent is flowing. "The fool and his money will soon part," in spite of all the officious, impertinent, intermeddling kindness of the laws.

The last argument urged in favor of the usury laws, which I shall examine is, that derived from the fact, *that almost all nations from the time of Moses to the present day, have either proscribed interest altogether, or restrained it within certain limits.* Generally I have the utmost respect for those opinions universally prevalent among mankind, and am willing even to concede that the universality of belief, in the majority of cases is, *prima facie* evidence of their correctness. We must make, however, distinction between questions of feeling and of reason. "On questions of feeling" I have elsewhere said "the opinions and sentiments of the world are generally correct." But on those which depend on reason, common opinion is by no means so unerring a guide. If I am

asked why *envy, malice, ingratitude, want of brotherly, filial, or parental affection*, are considered wrong, I would return you a satisfactory answer, by saying that mankind in all nations and ages have felt and pronounced them wrong. If I am asked however, why similar polygons are to each other in the duplicate ratio of their homologous sides, or why I know the sun to be the centre of our solar system, and the planets with their satellites to revolve in harmonious movement about this common centre, I can no longer answer you by saying mankind in all nations and ages have believed so." This is a question of reason and observation, and consequently not to be determined by popular opinion. The great problems of this character are solved but slowly in the lapse of ages, by the wise, the reflecting, and the investigating portion of mankind, who, in comparison with the great mass, the *vulgar genus*, forms but a small—a very small minority of the human family. On questions of reason and observation, the opinions of such men as Bacon, Locke, Newton, Smith, Turgot, and Franklin, are worth more than the opinions of the thousands, or even millions arrayed against them.* When we cast a retrospective glance at the ages that have gone by, and contemplate the progress of man, through the many gradations and stages which he has passed, and examine the systems of philosophy and of science which have had their day of admiration and devotion, and employed the busy spirits for a season, and then have sunk into neglect and contempt, we are almost disposed to believe that the cause of truth can never triumph, until man has been previously cursed with ages of error. How slowly has even the beautiful religion of our Saviour been spread abroad? How many millions are yet in darkness? How many ages must yet elapse before the gospel shall spread over the earth "as the waters cover the great deep?" And yet what exertions have been made—how many have been sent forth under the auspices of the christian religion into the heathen land? If then, religion itself, under the sanctions of Jehovah, armed with the most mighty arguments in its defence, pushed forward with untiring zeal and perseverance by the ministers of the gospel, and so essential to the happiness and salvation of the world, has nevertheless advanced so slowly, that even at this day the *vast majority* of the inhabitants of the world are still pagan—plunged into the grossest superstition and idolatry—can we wonder then, that legislators and governors should still be in error in regard to some politico-economical principles? especially when we recollect the sagacious remarks of David Hume, "that there is no subject on which the first impressions of men are so liable to be erroneous as the subject of politics." Are we not the last people in the world to acknowledge a binding influence imposed by ancient usage and general belief? Are not all our institutions innovations on the past? If the argument drawn from antiquity be conclusive, would not the monarchical institutions of Europe stand on a firmer basis than ours? Would not the monopolies and restrictions of the middle ages be re-

vived? Would not the law against witchcraft be re-enacted, with its laughable yet tragical train of proofs and punishments? In fact, the laws against witchcraft are as ancient, and until about two centuries past, as universal as the law against usury. Away then with this argument, so contrary to the genuine spirit of civilization and the onward march of the human race.

Sources of prejudice against Usury.

But as my lord Coke has justly observed, that "to trace an error to its source is to refute it," I will conclude by a rapid enumeration of the causes which have produced so universal a prejudice against usury.

The first cause which I shall mention is a *bigoted interpretation of a municipal provision of the Jewish code*. "Thou shalt not lend" says the law of Moses "upon usury to thy brother: usury of money, usury of victuals, usury of any thing that is lent." The punishment is of the severest character, "hath he given forth upon usury" "and hath taken increase, shall he live? He shall not live—he hath done all these enormities, he shall surely die: his blood shall be upon him." To this we answer in the first place, that the language of such distant ages may not be accurately understood by us—secondly, that this prohibition (if we understand it aright) extended only to the Jews. Moses wishing to make all the Israelites a band of brothers, the Jews were permitted to take what interest they pleased of the heathens round about, and this could not have been considered immoral, or hurtful, for the lawgiver, says "thou shalt not vex a stranger, or oppress him, for ye were strangers in the land of Egypt." Now lending at interest could not have been considered as either vexatious or oppressive to the stranger. Again the parable of the talents most conclusively shows that usury so far from being reprobated by our Saviour, was actually enjoined. The unprofitable servant is rebuked for "not putting his money to the exchangers, that he might have received his own with usury." Although however, the law of Moses was a merely municipal regulation, appertaining to the Jews alone, not restraining them in regard to other nations, and not sanctioned in the New Testament, yet has it had a most wonderful influence on the minds of men, and even to this day has not ceased to operate. For many ages in Europe it was considered against the law of God to take any interest at all on money. There is no crime against which the fathers in their homilies, declaim with more bitterness. As late as the middle of the seventeenth century, the divines of England preached against all interest; even that which the law allowed, as a gross immorality: and early in the eighteenth century, the same doctrines were supported in the British House of Commons. The editors of the *Dictionnaire Raisonné* in France about the middle of the eighteenth century employed as many as fourteen columns to prove that interest might lawfully be taken; and Turgot wrote a volume as late as 1779 to prove the same thing. "A learned gentleman (says Steuart) of the Middle Temple, Mr. Plowden (a lawyer I believe of the Roman Catholic persuasion) who published about thirty years ago a treatise upon the law of usury and annuities, has employed no less than fifty-nine pages of his work in considering the law of usury in a *spiritual view*, in order

* Although the majority be decidedly against us on the usury laws, we have in our favor almost every writer of eminence, who has ever profoundly investigated the subject.

to establish the following conclusion, *'that it is not sinful, but lawful, for a British subject, to receive legal interest for the money which he may lend.'* Mons. Neckar too, in the notes annexed to his *Eloge* on Colbert, thought it necessary for him to offer an apology to the church of Rome for the freedom with which he ventured to write upon this critical subject. Thus do we see the wonderful influence produced by a misunderstanding of the law of Moses: and we have besides, an illustration of what I have before urged, of the great difficulty and slowness with which error is banished from the world. Until very lately, all interest was considered immoral: that error is now exploded, and I hope in due time, laws restraining the rate of interest will meet with the same fate.

Secondly. *Men who are without property, or are unthrifty, and sinking in the world, naturally envy and hate those who are rising and prospering.* "The child who has eaten his cake" says Jeremy Bentham, "is the natural enemy of the child who has preserved his."

Thirdly. *In ancient times, and during the middle ages, men borrowed money principally for the purpose of paying debts.* The risk was great, and of course, the interest, very properly, was in proportion. The money lender had the borrower more in his power on such occasions, and the payment of the debt frequently ruined him. Thus the lender was made responsible for the imprudence and misfortune of the borrower, and became odious in the eyes of the world, especially in Rome, where the lender could imprison, enslave, and chastise his delinquent debtor. At this time however, the great mass of capital lent, is for purposes of agriculture and commerce. It is to be hoped then, that the prejudice against usury will diminish, since the wealthiest, and most prosperous men in society, are frequently the borrowers, paying only a portion of their profits to the money lenders, who are frequently widows, orphans, invalids, &c., whom the law ought rather to favor than injure.

Fourthly. *Money in the minds of the great majority of mankind has been identified with wealth.* It has been supposed that if the legislator would bring down the interest of money, that profits would be reduced—of course, that this would bring down prices, and thus the nation prescribing a low rate of interest, would be enabled to undersell all others. This was the argument which seems to have influenced the mind of Sir Josiah Child, in recommending to the British Parliament to reduce it to three per cent. Turgot, to a certain extent, was of the same opinion. I am informed that when the bank question was agitated in the Virginia legislature in 1816, many advocates of the banking system were under the impression that the quantity of money thrown into circulation would reduce interest—that would reduce profits—and thus we should be enabled to come in competition with producers in other quarters of the world. Now, if there be any strength in the preceding reasoning, this argument is wholly fallacious, proceeding upon premises entirely false. In the first place, money is not be identified with national wealth: it constitutes a very small part of it. As Dr. Cooper has well expressed it, money is to be considered as the *counters* that serve only to mark the points in the great game of commerce.

Again, when the government is good, a high

rate of profits is the most certain symptom of a thriving prosperous community; and he must be the merest political quack, who would now seriously recommend measures for the purpose of reducing profits. By means of profits, capitals are increased, and of course the greater the former, the more rapid the increase of the latter. This is most undoubtedly an axiomatic truth: and yet it is strange indeed, that so many should reason and argue as if perfectly ignorant of it.

Fifthly. *Debtors are more numerous than creditors; their misfortunes are lamented and pitied while the creditor seems hard-hearted and uncharitable, who appears so capable of relieving this distress, and yet exacts the money and penalty "even to the pound of flesh."* We are not to wonder then that the sympathy of the world, and the influence of numbers are arrayed in favor of the borrower, and against the lender. As a proof of what is here asserted, Bentham has given us a most admirable illustration in theatrical representations. "It is the business of the dramatist (says he) to study and to conform to the humors and passions of those, on the pleasing of whom, he depends for success." Now I question whether among all the instances in which a borrower and a lender of money have been brought together upon the stage, from the days of Thespis to the present, there ever was one, in which the former was not recommended to favor, in some shape or other, either to admiration or to love, or to pity, or to all three; "and the other, the man of thrift, consigned to infamy." They have thus been ever represented as a hard-hearted race, without any bowels of compassion, for their fellow men; yet as far as facts have come to my knowledge, in this state, I should assert that money lenders, take them as a class, are far from being uncharitable. We cannot properly estimate their charity, because the distress which they relieve seems, in many cases, to be brought on by them. Suppose, for example, A, a money lender, has lent B \$1000, and taken a lien on all A's property, which is finally sold. It may be that A has taken only legal interest, and that the loan when made, was of the utmost importance. Now, if he remits \$20 or \$30 of the debt, he will still be considered as unfeeling and uncharitable by the multitude who look unjustly on the distress of B as occasioned by A, and yet not one in that multitude perhaps, if called on, would be willing to contribute \$5 to relieve B's distress. There is no reason, if you will only reflect a moment, why the money lender should remit more of the debt than others of equal fortune are willing to subscribe to relieve the distress of the debtor. But on the contrary, there is an evident reason why he should do less in this respect, in each individual case, than other persons of equal wealth. His business necessarily brings such cases more frequently to his view, and therefore his profits would be almost entirely destroyed if he were to be as charitable in every case as perhaps another individual might well afford to be in the very few cases, in which his charity was put to the test.

The sixth cause of prejudice against usury which I shall mention, is indeed of a very puerile character, but it has had influence, and therefore must not be passed by. It was besides, the especial cause which operated most powerfully on the great, the almost unequalled mind of Aristotle. It is this: *"that interest ought to be charged on no-*

thing which is incapable of generating or breeding. Money is barren: one daric cannot generate another daric—therefore interest ought not to be charged on money." Thus you may charge for the loan of sheep or cattle. You may take hire for lands and slaves, &c. because sheep and cattle may breed, and land and slaves may produce or generate value. But you must not take interest on money, because Aristotle has made the wonderful discovery that one piece of money cannot beget another piece. "It is worthy of remark," says Stewart, "that the argument, such as it is, was manifestly suggested by the etymology of the word, *tokos* (interest) from *tikto* (*pario*), an etymology which seems to imply that the principal begets the interest. The same idea too, occurs in the scene between Antonio and Shylock, in the Merchant of Venice.

"If thou wilt lend this money, lend it not
As to thy friend, (for when did friendship take
A breed of barren metal from his friend?)
But lend it rather to thine enemy,
Who, if he break, thou may'st with better face
Exact the penalty."

It is hardly necessary to inform you, after what has already been advanced, that although one dollar cannot beget another dollar *directly*, in the way of generation, it may do it *indirectly*, in the way of business or trade. A borrows \$1000: he does not, it is true, expect this money to *breed* in his hands like cattle and sheep, but he may buy a farm with it and stock it with labor, and cattle, and sheep, from the proceeds of which, he may sell yearly \$1500 worth of produce, thereby making 15 per cent. on the capital, 6 of which he can well afford to pay the lender, who has enabled him to do this. Or if he be a merchant, he may buy goods to the amount of \$10,000, from New York, and sell them out for \$13,000, thereby making 30 per cent. on his borrowed capital. Or if he be intended for the professions of law, or medicine, he may obtain his education, purchase his books, buy his establishment, and support himself in credit until his practice may bring him in \$2,000 a year. Surely no one will now be hardy enough to deny the productive agency of money in these several cases.

The seventh and last cause which I shall mention as operating in favor of the usury laws, is the *general inclination of legislators to govern and organise every thing within their reach*. "Arbitrary regulations (says Say) are extremely flattering to men in power, as giving them an air of wisdom and foresight, and confirming their authority, which seems to derive additional importance from the frequency of its exercise; and hence one principal cause of the constant tendency of all legislative bodies to over-action." The legislator who claims the right, and thinks himself endowed with wisdom sufficient to "organise the whole labor and capital of a country," and to regulate the rate of interest, is an infinitely more bustling, important character, especially in his own estimation, than he who believes that commerce contains within itself, its own self-sustaining principles, and therefore practises upon the simple but wise policy of "*laissez passer*," and "*laissez faire*."

I hope by this time, I have satisfied you as to the causes which have led to the almost universal adoption of the usury laws, and that you are now fully prepared to assent to the great proposition on

this subject, which Bentham has established by a chain of reasoning pronounced by the most intelligent, to be almost as rigorous as mathematical demonstration, "*that no man of ripe years and sound mind, acting freely, and with his eyes open, ought to be hindered, with a view to his advantage, from making such bargain in the way of obtaining money as he thinks fit: nor (what is a necessary consequence) ought any body to be hindered from supplying him, upon any terms he thinks proper to accede to.*" If then I am correct in the views which I have taken, the usury laws ought certainly to be repealed as speedily as possible. In ordinary times, the legal rate, 6 per cent. corresponds with the market rate, and consequently no inconvenience whatever, would result from the repeal of the usury laws. Just at this time however, the market is much above the legal interest, and consequently some little inconvenience might result from too sudden a repeal. But it would not be so great as generally apprehended: for the moment you repeal the usury laws, you would put an end to most of those circuitous devices which persons have recourse to for the purpose of evading those laws, and which uniformly impose, as I have before shown, much harder conditions on the borrower, than when he is enabled to borrow directly. You may say indeed, that a sudden repeal would cause creditors to call immediately on their debtors to pay up, in order that they might lend to others. I doubt very much, however, whether the debtor would be placed in a worse situation than now; for at present the creditor who does not wish to push his debtor *himself*, just sells his bond to the broker, who will be certain to demand payment immediately, for he wants the money for purposes of speculation. To obviate, however, all objections on this score, I would recommend, if the market should continue long above the legal rate in this state, to repeal the laws gradually; to raise the rate of interest one per cent. or one-half per cent. every year, until the laws may be wholly abolished. Of course, there must still be a legal rate for all those cases not stipulated for, which might be fixed according to the wisdom of the legislature, from time to time. I shall then conclude my lectures on this subject, by expressing the wish that the states of our union will, ere long, see that the usury laws are in fact a branch of that odious system of restriction, which has blighted the prosperity of so many countries—which has raised the demon of discord in our own happy land, and threatened a dissolution of our confederacy: and that they will, by the repeal of those obnoxious laws, give another example of the innovating spirit of republicanism, which by its success here, and consequent adoption abroad, may have a tendency to break those chains of error, authority and long continued prejudice, in which the people of Europe have been for centuries bound, as if under the influence of some potent magic spell.

NEW ZEALAND FLAX—(*Phormium Tenax*.)

This plant stands the winter of England. In 1828 only 60 tons, valued at £2,6000, were imported from Sydney in Great Britain. In 1830 there were 814 tons, and in 1831, 1062 tons. The flax as prepared by the natives, is superior to any analogous material. Its price in London is from 15 to £25 pounds per ton.

SPONGE.

This well known marine production has been in use from very early times, and naturalists were long embarrassed whether to assign it a place in the animal or vegetable kingdom. Most authorities now agree in putting the sponges in the lowest scale of animal life. There are about fifty different species of sponges, of which nine or ten belong to this country. They are found in the Mediterranean and those seas in warm and temperate latitudes, diminishing in number and becoming of inferior quality on the approach to cold regions. They adhere to rocks in places the least exposed to the action of currents and waves, which the ebbing tide does not leave uncovered. The best sponges known to us are those which come from the Archipelago, where they abound near many of the islands, whose inhabitants may be said to subsist by the sponge-fishery, if we may so call it. At the Cyclades, for instance, sponge-diving forms the chief employment of the population. The sea is at all times extremely clear, and the experienced divers are capable of distinguishing from the surface the points to which the sponge is attached below, when an unpractised eye could but dimly discern the bottom. Each boat is furnished with a large stone attached to a rope, and this the diver seizes in his hand on plunging head foremost from the stern. He does this in order to increase the velocity of his descent; thus economizing his stock of breath, as well as to facilitate his ascent when exhausted at the bottom, being then quickly hauled up by his companions. Few men can remain longer than about two minutes below; and, as the process of detaching the sponge is very tedious, three, and sometimes four divers descend successively to secure a particularly fine specimen.

The best sponge is that which is the palest and lightest, has small holes, and is soft to the touch. By the old physicians, sponge was regarded as a cure for a long list of maladies; this last is now much abridged, though burned sponge, in which form only it is used, still has a place in the materia medica.—*Penny Magazine*.

THE RECENT HURRICANES IN VIRGINIA.

For the Farmers' Register.

The tornado of May the 5th, of which some account was published in the Farmers' Register for May, was without precedent in Virginia, in violence and destructiveness, and few persons, if any, could have anticipated the recurrence of a similar event. But within the short time that has since passed, a much greater extent of our country has been swept by a hurricane no less violent than its forerunner, and leaving throughout its course, a scene of destruction seldom produced by such causes, except within the torrid zone. I shall not attempt a minute description of any part of this terrible visitation, nor to present a full statement of even the important facts, which would be too long for this place: but merely to furnish a concise statement of the general results, by collecting and condensing the various reports which have been made by the newspapers.

The effects of the tornado of May 5th, reported in the May No. (page 763) were only a part of those which were suffered in the county of Prince

George. Similar scenes were presented throughout the course of the whirlwind, of about seventy miles in length, from its commencement in Lunenburg, to its termination in Prince George. Fortunately, its track was narrow, seldom being half a mile wide—but yet wide enough to leave many a farm a mass of ruins. The greatest loss was sustained in Nottoway. An official report from a committee appointed to estimate the losses in that county, states that between seventy and eighty houses were blown down, three persons killed, and many seriously hurt, besides the almost total destruction of the large standing timber every where in the course of the whirlwind. The damage to life and property in Dinwiddie, at one place, (the residence of Mr. Boisseau, near Petersburg,) was greater than on any other one farm.

On the same evening (May 5th) there was another whirlwind which passed through Caroline county, (separated from the other by a distance of more than sixty miles,) and which was nearly as violent and destructive within the narrower limits to which it was confined.

But these disasters were exceeded in magnitude and extent by another storm which occurred on June the 4th. This commenced its ravages west of the Blue Ridge mountains, and spread in different streaks through the lower country. In Rockbridge county, the wind was not very violent; but equal destruction, at least, was caused by hail, not less unusual in size and quantity. The following is the statement of the Lexington Union of June 7th.

"On Wednesday evening last a portion of this county [Rockbridge] was visited by a storm of wind and hail more extensive and destructive in its progress than any storm of the like kind within the memory of our oldest citizens. Between 2 and 3 o'clock, the sky in the north and north-east assumed a dark and threatening aspect; distinct masses of black and angry clouds whirling and tossed by counter currents of wind, were seen in every direction except in the south, where a serene blue sky prevailed. In about 20 or 30 minutes they congregated near the western end of the Jump mountains where they commenced discharging their contents of hail. Immediately a north-wester sprang up, which diffused and drove the clouds down Carr's creek, the southern border passing nearly over this place, and extending in breadth to the neighborhood of Timberridge church, a distance of six miles. The cloud continued its progress down the north river and across the upper part of Timberridge to the South mountain, ravaging a district of country of about 18 miles in length and 6 in breadth.

We have conversed with a number of highly respectable citizens from the region of this storm, who give most melancholy accounts of the injury which has resulted from it. The crops of rye are said to be totally destroyed—so that in place of reserving them for the sickle, they have been given up to the beasts of the field. The wheat crops are not so fatally injured—but in very many places have been abandoned, and stock turned in upon them. The corn crops have also suffered very seriously. Several farmers have told us that they have seen large fields of grain with fewer stalks standing than is sometimes observed after reaping in harvest, and that the stalks are not barely beaten down, but are shattered and broken. Numerous

other minor injuries have been sustained in broken windows, to the fruit trees, &c.

The general size of the hail, except near the borders of the cloud is described to have been so large as hen eggs—many of them much larger—some measuring 8 and 9 inches in circumference."

Similar disasters are stated in the following extract from the Sentinel of the Valley, to have visited Shenandoah, another county west of the Blue Ridge, and of which the nearest part is more than fifty miles distant from Rockbridge.

"This place [Woodstock] and neighborhood were visited by a hail storm, on Wednesday afternoon, which has left melancholy traces of its ravages in the prostration of trees and fences, the destruction of rye and other growing crops, and the breaking of thousands of panes of glass. In many places whole fields of rye have been literally cut to pieces, or so much injured as not to be worth the trouble of cutting. Most of the hail was as large as a hulled walnut, and many were picked up which measured from five to six inches in circumference. The storm approached from the north west, and almost every window facing in that direction, which was unprotected by shutters, was more or less damaged. The destruction of window glass, indeed, has been immense; so much so, that there is not enough to be had in the county, by one-fourth, to replace what has been broken."

The effects of the storm in Prince Edward, are thus described in the Farmville Chronicle of June 7th;

"The general direction appears to have been from west to east, south east; but it evidently performed, in many instances, a very whimsical and winding journey. Even in this village, it wound and twisted very much in the character of the whirlwind, bearing, with great force and violence, on buildings, so as to carry off those of feeble construction, and materially injuring some even of brick, of the best construction; then apparently wheeling nearly at right angles, leaving frail buildings, and other light objects near its tract, unaffected.

The width of its tract is probably not less than two or three miles, and it would seem, that along this tract, there passed several different and separate whirlwinds, always very narrow in their respective tracts, in which alone, does there appear to have been any great danger.

The period of time which the alarming and dangerous operations of these whirlwinds continued, was very short, scarcely more than one or two minutes; very possibly, not near so much, but the storm blew hard for 8 or 10 minutes, possibly more."

By the time the hurricane reached Nottoway and Mecklenburg, it exhibited its greatest violence, as is inferred from the following extracts from the Petersburg Intelligencer.

"We briefly mentioned in our last the effects of a tornado which passed through the county of Chesterfield on Wednesday, the 4th instant. We have since received information of another destructive storm which occurred, at the same time, in the counties of Nottoway, Dinwiddie, Sussex, and Southampton. These storms rival, in the extent of damage done to property, the memorable tornado of the 5th of May, last. Dwelling and out

houses, timber, fences, in fact every thing which came within the reach of their desolating fury, were swept away; but we are happy to say, that the loss of life has, as far as our information enables us to speak, been much less.

We have not heard of the effects of the storm on the north side of the Appomattox, higher up than Chesterfield Court House. From thence it pursued a direction inclining to the south of east, crossing the river into Prince George near Broadway, about nine miles below this town. Its width in some places was fully three miles. The plantations through which it passed, suffered severely—on several scarcely an out house has been left standing, the dwelling houses more or less injured, and the roads rendered impassable by the fallen timber.

The tornado on the south side of the Appomattox, commenced in the upper part of Nottoway, and taking a direction to the north-west, passed through the counties of Dinwiddie, Sussex and Southampton. The devastation is represented as appalling.

We annex a list of the sufferers as far as ascertained.

In Chesterfield—Captain John W. Gill, Thomas Shell, John Walthall, Walthall Marshall, Wm. Corling, Mrs. Archer, Mrs. Lynch, Wm. R. Hill, the estate of the late Armistead Hill, O. P. Hare, and T. P. Hare. At Mrs. Archer's the overseer and one servant were injured—her loss in out-houses, timber, crop, &c. is very great.

In Nottoway and Dinwiddie—Rev. T. Pryor, Dr. H. C. Worsham, James Jackson, estate of Peter B. Jones, Wm. B. Wilson, E. G. Booth, Mrs. Bland, Mrs. Verser, Mrs. Morgan, Mrs. Branch Jones, Mrs. F. Epes, Thos. Goode, Gen. Wm. H. Brodnax, Dr. Wm. Cutler, Mrs. Rose, John G. Williams, (one negro killed) J. Foulkes, (two negroes killed) Mr. Edward Royal, (one negro killed.) Mr. Greenway, (lost his mill and all the farm houses.) We learn that at Kingston, the residence of Gen. Brodnax, the family mansion is the only building left standing, and even that bears marks of the fury of the storm. In Nottoway several plantations which suffered from the devastations of the tornado in May, experienced severe injury on the present occasion.

In Sussex—Wm. Winfield, Mr. Thos. Wills, J. Lee, and Capt. N. Heath, who lost every house on his farm—himself, his wife, sister, and all his negroes more or less injured, but none very dangerously.

We have no certain accounts of the destruction in Southampton county except in the vicinity of the Barn Tavern, belonging to Mr. D. Simmons; there we understand, several houses were blown down, and one person killed. The plantations of C. Urquhart, Z. Simmons, and Jesse Little, suffered considerable injury."

"The only plantation [in Mecklenburg] from which we have any particulars are those belonging to Major Thomas M. Nelson and Mark Alexander, Esq. The former lost every house except his dwelling; a saw mill and a large three story grist mill were likewise entirely demolished. At Mr. Alexander's the mansion house is the only building which escaped destruction; and fifteen of his negroes were wounded, some of them seriously.

These tempests were accompanied or preceded by hail."

The course through Nansemond was marked by destruction of similar character, though of less extent—and the storm though much moderated in violence, was still awful and terrible in its passage over Norfolk. The following description is from the Norfolk Herald of June 6th.

"A dense and dusky cloud hung over our town on Wednesday evening, and discharged for the space of an hour, a torrent of rain and hail, with the severest thunder and lightning we have witnessed for many years. The lightning exhibited one continued glare of flickering light, that left not the smallest conceivable interval of darkness; while the thunder kept up an incessant and deafening roar, enough to appal the stoutest heart. Two or three crashing peals that seemed as if they had rent the earth asunder proclaimed that the storm was not venting its fury harmlessly;—and we soon after learned, indeed, that the lightning had struck the livery stable of Mr. John Ford, but without doing any other injury than ripping off some of the boards. It also struck a small brick building, contiguous to the dwelling house of Mrs. Jane Collins, on Smith's Point, which it very much injured, and a young negro woman, who was at the fatal moment stepping in at the door of the building was knocked down, and so severely stunned that she is not expected to recover."

The foregoing are but detached statements of scattered facts, and limited views. But from these it may be inferred that the amount of damage to property is enormous. The loss of lives, and the lesser personal injuries suffered, are much fewer than could have been supposed, from knowing the other effects of the different storms—but still, the deaths and wounds inflicted, probably exceed in number, all produced in Virginia from similar causes, since the first settlement of the country.

Perhaps the circumstance which was the most terrible of all in the different storms, was the very short time in which the destruction was produced. The storm was raging with less, and no very uncommon violence, for a considerable time: but the hurricanes or whirlwinds passed over as it were in a moment, without giving scarcely an indication of approach, or even time to observe their progress. Those who suffered most from the effects found at once that their houses had been destroyed, and members of their family wounded or killed, before they well knew that the work of destruction had commenced. Opinions are various as to the duration of the storms in their greatest violence—but by none is it made more than a few minutes, at any one place.

Some of the farms in Nottoway which had experienced the full force of the wind on May the 5th, were again visited, and the destruction completed by that of June the 4th. The first storm passed near Petersburg, and exerted its greatest fury a few miles south of that town. The second passed as near on the north. If either had passed over the town, it would have been left in ruins.

I.

[And yet another! Since the foregoing was in type accounts have been received of another tornado on June 21st, which, in the neighborhood of Williamsburg, has produced effects no less awful and deplorable than those already reported. The violence of the

wind lasted only one or two minutes. In Williamsburg between thirty and forty chimneys were blown down, and several houses. On the farm of Scervant Jones, Esq. seven of his negro houses were demolished—some of the negroes wounded. Col. William Waller's granary and stable were blown down, and seven negroes more or less hurt. All the grain houses and stables of Dr. Waller and of Mr. S. Bright were levelled, and similar damage was done at other places. At Jockey's Neck, the farm of Thomas Coleman, several houses were blown down. Mr. Coleman and two of his negroes were crushed to death—his overseer had a limb broken, and four or five negroes were much injured. All these persons had taken shelter in one of the houses which were levelled by the storm.

The course of the storm was from N. N. W. In crossing James river, it capsized three schooners, and drove a brig ashore.

The same storm, (or another at the same time) was in a different manner very destructive in a part of Prince George county, on Warwick swamp. Hail there fell in prodigious quantity, and some of it very large. It remained on the earth, where lying thickest, for more than fourteen hours, notwithstanding the warmth of the earth and air, and a heavy rain which fell after the hail. The wheat in that neighborhood had not been reaped, and none is left for the scythe. Corn and cotton was woefully torn and beaten down; but the former, if not both of these crops will probably recover.]

AGRICULTURAL INTELLIGENCE.

Season and state of crops on the Lower Roanoke—observations on cotton, &c.

To the Editor of the Farmers' Register.

Bertie County, N. C. June 20th, 1834.

A paragraph in the last No. of your "Register," inviting the farmers residing in different sections of the country to give a report of seasons and crops in their respective vicinities, induces me to contribute my mite.

So far, the seasons have been rather unfavorable, and the effects are very visible on our farms. It has been generally dry, with occasional heavy and baking rains; unusually cold and hostile to vegetation. As an accompaniment to the cold nights, the worms have been busy with our corn, and the blackbirds have done their share of mischief. From this cause we have an indifferent stand of corn, both uneven and backward. These attacks of the worms are not confined exclusively to the low and wet places in the farm, but prevail extensively on high dry lands. Farmers of long experience have frequently stated in my presence this spring, that in no former year have they been so much annoyed by worms, or have they been compelled to re-plant the same ground so often, with such little success.

A few years since, corn was the principal article of produce made for sale on this part of the Roanoke; but latterly much time and attention are bestowed on cotton. This is also more backward than it was last year at this time; the dry weather which succeeded after the cotton was planted, prevented it from coming up in the stiff land, and it

did not vegetate until the rain of the 25th of May softened the earth. While coming up, it had to encounter two considerable frosts in the nights of the 15th and 16th of May; owing to the dry state of the soil, the injury was not so severe as a knowledge of the sensitiveness of the plant induced me to expect. On very light ridges, some damage was sustained: this was also the case on moist land. It was fortunate for the cotton farmers that no rain had been granted to their oft repeated wishes, as it was the only thing which saved the cotton. In many fields the cotton exhibited black leaves—some of it died, but a great deal recovered—and the rain which descended, caused many seeds to come up which were still in the drill. Yet notwithstanding the cold and dry weather, we have a better stand than usual. The quantity of cotton to be made with us depends on the seasons, and visitations to which it is frequently subject. One of those visitations I will describe: it is called the rust, from its appearance, and its faculty for imparting a stain to any thing white which comes in contact with it. Growing cotton of all sizes is subject to its attacks. It is caused by an insect which fastens on the leaves, extracts the sap of the stalk, destroy its vitality, and forces the bolls to open before they are matured. It is confined to no particular kind of soil, and generally spreads in a circular form until it covers a large portion of the field. Various remedies have been essayed in vain to arrest its progress—fat meat dragged over the cotton, brimstone matches burnt under it, and healthy stalks pulled up all around to prevent its being in contact with the other cotton—but none have succeeded.

I must avail myself of the present opportunity to place on record some facts respecting the small injury inflicted on cotton by inundation from river water. In May 1833, we had a tremendous freshet in the Roanoke which inundated some of our lands which had enjoyed a total exemption from such rude lavations for several years. A large portion of my cotton was completely immersed in water—some to the depth of three feet. After the subsiding of the flood, in many places the grass was killed and the cotton was left alive, though much washed. From one portion of my field the water retreated slowly, and to all appearances left the grass and cotton both dead, and in a few days its leaves dropped off, leaving the stalk still standing. I intended to plough and plant this piece in corn; but a fortnight after the freshet when I was about to plough it up, I observed that the bud was still alive, and for the sake of experiment I left it untouched. Some time in July new leaves had come out, and I hoed it for the first time: it had been sided with the plough before the freshet. After this cleansing (for it was extremely foul) it grew off rapidly, and at the end of the season equalled the other cotton in size; but it had been neglected too long, and many of the bolls were cut off by the frost. From this, we may entertain some hopes of cotton, so long as the bud remains uninjured.

This communication should end here, but I am desirous of bringing to the notice of cotton farmers the advantages to be derived from planting the "petty gulf" seed. These are brought from the south, and take their name from a cotton growing district near the Mississippi, which produces them. The stalks grow large in land adapted to cotton, and bear more than ordinary cotton. The cotton

is white and silky, with a superior staple. The bolls open very widely, and the cotton awaits the slight pull of the laborer with impatience. From the ease with which it is plucked from the boll, a hand may pick one-fourth more during the day than he can in the common cotton, and do this with infinitely more ease. It is more liable to suffer from wind and rain, and requires to be picked over more frequently: yet notwithstanding its liability to drop out, still it will yield more than the common cotton, and from its appearance will undoubtedly command a more ready sale and higher prices. It blossoms and matures as soon as the other cotton. As an evidence of the value in which it is held by those who can easily procure the seed, many of the planters of Red river are in the habit of receiving annual supplies to plant their crops.

On the subject of cotton I have written more with a wish to ascertain the views of others, than with the expectation of imparting any thing new.

The importance of manuring begins to be understood here; and though destitute of marl, yet we can effect a change in the face of the country by sowing small grain, resting our fields, and applying the manure accumulated in our farm pens. So far, most of the farm pen manure is applied to our cotton land in the drill. On some of our farms we have found gama grass—as yet, few have turned their attention to it; it is a plant of rapid growth, and is eaten with avidity by the stock that have access to it. When improperly located it is difficult to be destroyed, and a partial grubbing merely divides the large bunches and sets them out.

W. W. P.

STATE OF FARMING IN CAMPBELL COUNTY.

To the Editor of the Farmers' Register.

* * * * * You request your subscribers to communicate any information about the seasons, crops, mode of cultivation in those parts of the country where they respectively reside. This part of the state, as you probably are aware, is entirely given up to tobacco making, and very few of us, and those very recently, have devoted any attention whatever, to the improvement of land. In the immediate neighborhood, in which I reside, a strong indisposition is felt to abandon the old mode of cultivation—to relinquish present for permanent future profit. Our lands are not naturally fertile, and clover, and plaster are considered too costly means for giving them fertility. The price of the latter is about double what it is in Richmond, in consequence of the enormous freight, upon so heavy an article. We are without the marl banks, which furnish so abundant, and so rich a manure in your tide-water country, or indeed, any kinds of manure except what is furnished by our farm-pens and forests, and which are not common to this, with every other portion of the state. We are not however, I hope, without some advantages already known, and shall find, when we turn our attention to the subject, that we enjoy others hitherto undiscovered. We have yet a good deal of fresh land, and forest; and our soil although not very fertile, is peculiarly adapted to wheat, a crop, which I believe all our farmers are endeavoring to increase, while others are diminished. Considerable crops of it are now

sown, but principally on corn-land, a small portion of it after tobacco. Scarcely any persons among us fallow for wheat, and nobody has more than three shifts. All the manure from our farm-pens, and that a much smaller quantity than might be made with a little industry, is literally poured out on a small spot intended for tobacco, to the utter deprivation of the remainder of our lands, most of which, are of course in a rapid state of deterioration. Many of us are convinced of the expediency, nay necessity, for a change in our mode of cultivation. No individual has as yet been found among us combining the requisite qualifications of energy, industry, some capital, and above all a determination to endure any petty inconveniences, and overcome any small difficulties in the way, who will set an example of successful improvement to his neighbors. It is to be hoped, however, that some such person will in a short time give an impulse to our agricultural efforts, and enable us to contribute our rate of information to your valuable paper.

On the 14th, 15th, 16th, 17th and 18th of May, we had frosts, which on several of these mornings seriously injured vegetation. In some parts of the surrounding country, the corn and tobacco plants were bitten down to the roots, and scarcely any cultivator of either, escaped entirely without damage. I am compelled to get my letter ready to be sent to the post office, and no doubt very much to your relief, have only time to add my best wishes for the success of your patriotic and hazardous attempt to turn the attention of Virginians to a mode of internal improvement, depending principally on each individual, and independent of legislative patronage.

Buckingham Court House, June 20th, 1834.

Wheat not as good a crop as was expected early in the spring—not as tall as wished—grain good—supposed about an average crop. Harvest will generally commence on Monday next the 23d (June) in this part of the county.—Oats very good.—Corn very small for the time of year.—Clover not worth cutting hardly, except on good lots, where the land is very rich.

The frost of the 16th May did but little injury to the crops in this neighborhood.

Much more attention is paid to farming and improving the land in this part of the country than formerly. The extent of tobacco cultivation is very much lessened.

Several gentlemen of the neighborhood have commenced improving the breed of neat cattle, sheep, and hogs, &c. Several of Meade's (of Frederick) fine cattle are in this neighborhood.

P. S. On the 4th of June the upper end and south end of this county was visited by a tremendous hail storm and wind sweeping every thing before it, destroying entirely, the crops in its course—hail as large as eggs—many houses were blown down, and other serious damages done to trees, fencing, &c.

RICHMOND, FREDERICKSBURG AND POTOMAC RAILWAY.

[The unusual quickness with which a very large subscription has been made for the Richmond and Fredericksburg railway as stated below, (and especially

in this time of general pecuniary distress, which affects injuriously every such undertaking.) furnishes a gratifying augury of the complete success of the work. Northern capitalists, whose object of course is to obtain the best interest for their money, have contributed very largely to this subscription; and their participation to so great an extent, is another strong proof of the profits expected to be derived.]

From the Richmond Compiler.

The books were closed yesterday. The result will appear from the advertisement of the commissioners in another column. More than three thousand shares of the stock have been subscribed: and the company is to be immediately organized. A meeting of the stockholders is called for this day week; at which time a president and five directors will be elected.

It is gratifying to perceive how much has been accomplished in this instance by the efforts of a few individuals. It is less than a year since the scheme was first suggested in our paper. Many then pronounced it wholly visionary. In a few months, public sentiment was manifested most strongly in its favor—so strongly that in October when a small sum was wanting to defray the expense of surveying the route, we believe subscriptions would most readily have been obtained for the whole amount necessary to execute the work. Since then a pressure has occurred in the money market, so great that many of those most strongly in favor of the railway thought it would be impracticable to raise money for this or any other work at the present time. The commissioners however determined to make an effort, to obtain the sum requisite to organize the company; and that effort has proved successful. Nothing can show more strongly the confidence now felt in the scheme than the fact that stock to the amount of \$300,000 has been taken, notwithstanding the pressure universally complained of. The truth is that in this city, the opinion is now general—indeed almost universal—that an investment in this stock will prove an exceedingly good one.

So soon as the president and directors are elected, prompt measures will be taken for the location of the road. By November or December, it is believed that it will be practicable to put thirty miles of it under contract. And in January the contractors will be able to commence the execution of the work. In three years it will probably be finished to Fredericksburg, and then the trip may be made from Richmond to Washington in eight hours—between an early breakfast and a late dinner. When that happens the passengers between these two cities will be almost without number. Then our representative in congress will never be at a loss to know the wishes of his constituents. He will be able to visit us once a week without neglecting at all the public business.

Even before the completion of the rail road, its effects will be very perceptible. It will no doubt be commenced near this city, and when it reaches as far as the Pamunky, there will be a considerable quantity of produce and a good number of passengers upon it. Dividends may then be declared, and thus the stockholders will be receiving the profits of their stock before they have paid up the whole amount. The arrival of the cars at

stated hours every day with passengers and produce will then give a most enlivening aspect to our city. We rejoice at the prospect.

MONTHLY COMMERCIAL REPORT.

To the Editor of the Farmers' Register.

The annual period of commercial inactivity is now approaching—if in Virginia any period can be called inactive—for the succession of different crops which her soil produces, is such, that one or the other occupies its respective dealers throughout the year.

The crop of cotton, except an inconsiderable remnant, has been received and disposed of. The total receipts in Virginia for the year ending 1st October next, may be estimated at 42,000 to 43,000 bales—disposed of thus:

	Bales.
Shipped to foreign ports, - - -	30,000
Coastwise, - - -	6,000
Manufactured in Petersburg, Richmond, &c. 5,000	

Each of these items, it is believed, will be within the mark, but the last has not heretofore been taken into account in estimating the crop. It begins now, however, to assume sufficient importance to deserve notice. The supply of cotton to Petersburg from North Carolina, has been increased this year by the facility of getting it to market on the rail road.

Whilst the operations of the manufacturers in this country have been considerably diminished, and rendered unprofitable, those of England and France have increased, and thriven to such an extent as to require nearly all the raw material which had been furnished to them up to the latest date from thence: prices were consequently supported there, and an advance created here—the Petersburg quotation being now 12½ to 13½. But as large supplies were to arrive in Europe after that time, there is more likelihood of their having a redundant, than a limited stock. The crop of 1833, in the United States, it is estimated, will reach, if not exceed 1,200,000 bales—that of 1832 was 1,070,000.

This is the season of greatest activity at the tobacco inspections, and as an impression prevails that the quantity will prove smaller than usual, prices have recently advanced, particularly of the finer qualities—the general sales of such, are between 8 and 10 cents, but for fine and superior 11, 12, 13, and even 15 in a few instances have been paid. The lowest quality sells at 3½ to 4, and other sorts at all the intermediate prices up to good and fine. The result of the crop, as to quantity, cannot be ascertained until October. The foreign orders, both for cotton and tobacco, have this year been larger than usual.

The increase of flour mills in Richmond has increased the competition in the wheat market, and contracts have been made for the new crop at \$1 15 cents per bushel. The usual demand for new flour for the South American markets, as well for those of our northern cities, of which Virginia furnishes the earliest and best supply, gives a great advantage to her farmers who possess facilities for delivering their crops early in the season.

It is pleasing to remark that the recently projected work of extending a rail road from Richmond to the waters of Potomac is about to be un-

dertaken. The subscription of \$300,000, for which books were opened, have been readily filled, and it is understood that operations will be commenced forthwith. When this work shall be completed, there will be a continued line of communication by steam power from Boston to Roanoke, with two very slight intermissions; and we may hope to see ere long similar improvements extended to Raleigh, and further south.

The great work of improving the western communication from Richmond to Kanawha, is also said to have assumed a more favorable aspect.

X.

June 26, 1834.

EXTRACTS FROM PRIVATE CORRESPONDENCE.

THE WORM IN PINE TREES.

Orange, April 5th.

We lost much of our best pine timber last summer by a white worm (as it is supposed) that bores into the trees and kills them. They are in clusters of from ten to fifty. I apprehend that it is an increasing evil, without remedy, more to be dreaded than the Hessian fly, and which cannot be exterminated, not even by the "restoration of the depositories." Information from any quarter upon this subject, would be acceptable to many of your subscribers, no doubt, for I believe the injury to be extensive and extending.

[The habits of the insect which is so destructive (under certain circumstances) to pine timber, will furnish an interesting as well as useful subject for investigation—and we hope that the foregoing request for information will receive due attention from some of those who are able to give it. It is believed that the destruction of standing trees by these insects, is always produced by the cutting down or killing a pine in the beginning of summer, and thus furnishing the most fit receptacle for the eggs of the insect, which soon hatch in such numbers as to spread over, and often to kill many surrounding trees during the same summer. From such facts, it would appear, that the worms speedily assume the winged state, and leave their native tree. But on the other hand, sap timber containing the eggs, or the worms, used in building houses, will continue to be inhabited by them for a long time, and sometimes until they have eaten up nearly all the inside of the wood.]

The wide destruction of pine trees by the recent hurricanes of May and June, will probably be the means of producing these worms in immense numbers, and by their attacks, of extending still farther the loss of timber already sustained.]

I purchased of R. K. Meade, Esq. of Frederick county, Va. in May 1832, a pair of fine Frederick sheep; the buck two years old, the ewe one, for which I paid him \$65 delivered in Alexandria. The ewe had a ewe lamb the 13th December, 1832—the lamb remaining with her. She had a ram lamb the following July, the 13th, which I have sold for \$25; and on the 24th January, 1834, she had two—a ewe and ram, and raised them both. Her first ewe lamb, which she had on the 13th December, 1832, now has a fine ewe

lamb by her side. She sheared 7 lbs. of wool "in the dirt."

BARLEY CROPS IN GLOUCESTER—CATERPIL-
LARS—WHEAT.

Gloucester, June 14th, 1834.

* * * * I am very well through with my barley harvest, and decidedly the heaviest crop I have ever made, or has been on the estate for many years. The wet weather in the spring (or something else) destroyed, as I hoped when I last wrote you, the caterpillar: I have not seen one amongst the small grain this summer. I think notwithstanding the prospect for wheat appears to be very good, there cannot be a heavy crop in our section of country: the wet weather in the spring must have injured it, and the scab was generally appearing when I left the county about a week since. Barley was the staple of Gloucester until within a few years: the crop so generally failed that it was nearly abandoned last year.

PARTRIDGE PEA.

Dorchester, Md. June 12th, 1834.

* * * * When I spoke of the wild onion, I might have added another pest in a part of my grounds:—it is, I think, what is called the "partridge pea;" but the ground being extremely rich, it runs up as a vine, and drags down and destroys my wheat. I have lately cut about two acres of my rankest wheat, so matted with this vine, that, together, they will make me nothing but hay, and the horses and cattle are very fond of it. But it is a costly food—such fine wheat—and how shall I eradicate the vine?

[We refer our correspondent and others who suffer from this weed to page 106 of vol. I., for what are believed to be the best means to prevent such losses.]

* * * * It is the only way in which I can aid your establishment, in the success of which, I feel much interested, as the best mode of drawing the attention of our young men to the subject of agriculture, thereby affording constant and useful employment,—the great secret and source of human happiness. Few of us can remain idle virtuously. I think if St. Paul himself lived in the present day, he would consider idleness, rather than money, the root of all evil. God forbid that I should consider property as adding one particle to the character of an individual,—it only serves to make him more contemptible, in my estimation, if his conduct is not correct,—but generally speaking, in our country, where it is so easily acquired, if you show me a man destitute of property, I will show you one who has done nothing for the benefit of his fellow men, and over whom society has no control.

REMARKABLE HABITS OF THE AMERICAN
LOCUST.

To the Editor of the Farmers' Register.

Sir—In a note appended to an article in the last number of the Farmers' Register, extracted from the Germantown Telegraph, you remark that, "there is too much of the marvellous in the regularly returning visits of our locusts for the

statement to be altogether credited." So far from its being marvellous, I have never before heard it questioned. I have witnessed three regular returns of the locusts at the distance of seventeen years from each other, viz: in 1792, 1809, and 1826. Their appearance in those years was foretold by the old people long before it actually occurred. It is very certain that they do not make their appearance in all parts of the United States in the same year, but at any given place I am very confident that it will found to be regularly at intervals of seventeen years. I think you will be able to find some old persons in Prince George who can remove your doubts on this subject. I have frequently heard it asserted that well-diggers had found them ascending at considerable depths below the surface of the earth, in the years preceding their regular return.

Respectfully your ob't. serv't.

F. H.

Louisa, 21st June, 1834.

[Before receiving the foregoing interesting statement we had been convinced by the force of the facts reported from various quarters, that the regular periodical returns of the locusts were no less true than strange. According to the predictions published, they have appeared in vast numbers this summer in various parts of the United States. But though abundant both to the north and south of us, none have appeared in this county, nor (as it is said) any where in lower Virginia. It is an additional wonder that their visits should be at different times in different places, and yet in each, at regular periods of seventeen years.]

ON THE PROBABILITY OF THE REVERSION OF
WHEAT INTO GRASS.

By Mr. WILLIAM BLACKADDER, *Glamis*.

From the Quarterly Journal of Agriculture, [Dec. 1833.]

When I was at the Trinity Muir market of Brechin in June last, Mr. David Scott, of Newton, near Arbroath, came to me, and inquired if ever I had heard "*that if the smut balls of wheat were sown, they would vegetate?*" and, on answering in the negative, Mr. Scott stated, that Mr. Strachan and Mr. Bell, farmers near Montrose, had sown them for some years, and the balls had always sprung, but had never advanced to maturity until this season, when some had actually flowered, and appeared to be a grass; and that he had requested a specimen to be brought to the market for my inspection.

Just at this period of the conversation Mr. Bell made his appearance, and produced a specimen, which I recognised to be a species of *Brome*; and on questioning Mr. Bell minutely as to the mode of its production from smutted wheat, I was satisfied that little, if any, doubt could be entertained of the fact. The discovery that smut balls vegetated was first made by Mr. Strachan, and then experiments were tried by Mr. Bell; that the experiments had been continued for years; but the balls having been usually sown in spring, they had never had time to flower. Last year, however, they were sown in the autumnal wheat seed-time, part of which flowered this season, of which the one produced was a specimen.

On my return home, I compared the specimen

with the family of the *bromes*, in a herbarium of the British graminæ, which was prepared for me by the late celebrated Mr. George Don, of Forfar, and which has been frequently examined by eminent botanists, and much prized: but although it possessed the general characters of a *brome*, it did not exactly coincide with any of the individual species in the herbarium. It then, for the first time, occurred to me, that it might more nearly agree with the *giant fescue*, and on turning over to it, found this conjecture to be correct. Now this species was placed by Linnaeus in the *brome* family, but removed to that of the *fescue* by Sir James Smith, whose authority is now followed; and it may be here observed, that in the natural system of Jussieu, the *wheat* is made the intermediate link between the *fescue* and the *brome*.

In the course of the season, I had mentioned the above particulars to various of my scientific friends, to whom I stated my conviction of their truth, not only from what I had learned from Mr. Scott, who is well versed in botany, but also from the circumstance, that, some years ago, when passing through a field of young grass, on the farm of Dysart, in the same district, which had been sown among wheat, I found a large tuft of the *giant fescue*, and was puzzled how it had got there; and it also occurred to me, that if the *brome* was the type of our cultivated wheat, that other species might also spring from different diseased states of it, and particularly the one which infests it so much, notwithstanding the care usually taken to screen it out of the seed.

Latterly, having been urged to make farther inquiry into the original facts, and having occasion to be lately in the neighborhood of Montrose, I called upon Mr. Bell; but his tuft of grass had been accidentally destroyed only a few weeks before. He, however, readily offered to accompany me to inspect what belonged to his neighbor, Mr. Strachan; and on our way, I was glad to learn from him, that the *common brome* (provincially named *sleepies* in that quarter, from the opinion that the bread made of its flour is conducive to sleep,) had also made its appearance from the diseased seed; and that smutted wheat, *sleepies*, and another grass, had all grown from the smutted wheat-balls sown in the previous autumn; neither the wheat nor *sleepies* having been in flower when I had met Mr. Bell at Trinity Muir market.

On our arrival at Balgove, Mr. Strachan took us into his garden, and we there saw a tuft, the produce of smutted wheat-balls, consisting of a mixture of smutted wheat, *sleepies*, and another grass, but the latter not in a state to be accurately recognised, farther than that it was a *brome*; and at some distance, he showed us another tuft, which consisted partly of sound wheat, and partly of smutted balls, and which was the produce of winnowings, or small wheat, but clean and not smutted. Mr. Strachan also showed us some newly braided from smut, sown this season, to see what may be the result next year, there being a bet depending on it in Montrose. He has also sown some of the seed of the *sleepies*; and Mr. Bell is likewise continuing his experiments.

On inquiry, Mr. Strachan, who is now an aged man, informed me, that, fully twenty years ago, he happened to throw out a mixture of small and smutted wheat to the poultry, at a distance from

the dunghil, and that, some time afterwards, he was surprised to observe a strong tuft of *grass* springing up; for, as he justly concluded, it was very unlikely that the fowls would leave any of the grain; and it then occurred to him, the smut-balls would certainly vegetate, which he has repeatedly verified since that time by direct experiments; and his neighbor Mr. Bell, having seen these, also began, six or seven years ago, to make similar experiments, and which have been attended with similar results; but as the sowing always took place in spring until last year, the plants had never flowered.

It seems that particular care is necessary in sowing smut-balls, that none of them be in the least injured or broken; and also if they get much rain or damp before they sprout, they will be destroyed; and to avoid risk, Mr. Strachan sometimes places the entire head into the soil, without taking the balls out of the ear.

On comparing a specimen of these *sleepies* taken from Mr. Strachan's tuft with the *bromes*, in my herbarium, I find it to be the *Bromus multiflorus*, and to which Mr. Don has appended the remark, "*common in wheat-fields*." Another specimen has the appearance of the *Bromus mollis*, but is so much decayed, that it cannot be accurately referred to. The unfortunate destruction of the tuft raised by Mr. Bell, prevented me ascertaining whether there had been any more of what resembled the *giant fescue*. In regard to the origin of these specimens, the facts are as above narrated; and if they are hereafter verified by others, besides explaining very satisfactorily the cause of the *brome-grass* being such a frequent weed in wheat districts, will give rise to the new and interesting view in vegetable physiology, that, after a certain stage of cultivation, a limit takes place, beyond which cultivation cannot be carried; and that plants are subject to what may be termed a disease, in respect to the wants of man; but which limitation may perhaps be a provision in nature, to revert the cultivated grains back into their original type.

From the neat condensed view of the opinions of many eminent practical men and naturalists upon smutted wheat, given in a late number of this Journal by Mr. Donaldson, the mystery of its origin, its nature, and inveteracy of cure, are set forth in a very lucid manner. No notice, however, is taken of the vitality of smut, so as it can reproduce grains or grass; neither have I been able to trace that fact elsewhere, and Mr. Strachan's discovery appears, therefore, to be entirely new. From his experiments it may be inferred, that smut is, at least, in certain cases, produced from light seed, and that its vitality is not destroyed, but merely impaired from producing healthy wheat, as some stalks of it reproduce smutted balls, and others healthy *brome* seeds, which bear a strong resemblance to rye; and, as justly remarked by my friend, the Rev. John M'Vicar, these different states of the balls become objects of much interest. That the *brome* of botanists is the *true type of wheat*, the present experiments certainly do not warrant, for the change may be merely an intermediate step. As, however, neither *wheat* nor *rye* has ever yet been found in a *native* state, it is to be hoped that Mr. Strachan's discovery will attract the serious attention of naturalists, and the results to which it points be fully investigated; and it is with such a view only that I have been induced to

draw up the preceding narrative, being well aware that it will be received with much incredulity.*

THE USEFULNESS OF BIRDS TO THE FARMER.

From the Portsmouth Journal.

It has been the ravenous practice of man to destroy all those beautiful creatures—and the more beautiful, the more furious he is to destroy them, and that too without the least gain.

Now can we be candid enough to consider the evil consequences of this practice, as well as the great benefits to be derived in forbearance of such a practice? It is my present intention to set forth some of the evils resulting from such brutal and inhuman practices, and to endeavor to bring to view some of the benefits unavoidably resulting from their discontinuance.

It is a melancholy fact in this vicinity, and probably elsewhere, at least as far as the extent of the New England States, that our songsters, who give the most delightful of all melody, are so extinct, that in our usual walks of business or of pleasure it is rare to hear or see a solitary one, especially one of those admired songsters the *navis* or *mock bird* that is so distinguished above all others of the bird tribe,—especially to see her so bold as formerly, rise to the top of a high tree, determined that every note should be distinctly heard, and there for fifteen minutes in succession, without the least intermission, never repeat a single note; as soon as her song is ended, she is sure to remove to another of the loftiest tops and pitch another song in as clear and deliberate a manner as any of the human tribe possibly can.—Now the poor songster, if she presumes to show her head, or sing us one of her old hundreds, even in a bush, she is immediately put to death.

The singing of birds in general, is above all music particularly at the closing of our long frozen winters, after being long shut up and excluded from most of the enlivening exhibitions of nature. The sight of a variety, and of plenty of those birds with their warbling voices around us in our walks, and in our business, would change the present melancholy scene very much. It is surprising that we notice the very great difference within a few years; I could once see a tolerable number of different species in my orchard, and about my farm; but men as they call themselves, and boys, would flock around my dwellings, and in dry seasons, when there was much danger of fire being kindled from their guns. Every bird of every description, was shot on its nest, or off no matter, if a bunch of birds could be obtained to carry home for a show. I am not troubled with those

* It may be right to notice that, in the experiments here described, no precaution seems to have been taken to provide against the possible existence of the brome or the fescue seed in the soil in which the smutted wheat was sown. The experiments cannot, therefore, be regarded as conclusive. Farther, when we consider that the brome-grasses have a panicked inflorescence, while the wheats are spiked, and that the glume of bromus is many-valve, while that of *Triticum* is bi-valve only, we ought not readily to admit the probability of the one genus passing into the other, even by crossing of pollen, far less by accidental disease. Nevertheless we should like to see the statements contained in this paper either verified or refuted by accurately conducted experiments.—EDITOR JOUR. AGR.

gunners now; there are no birds on my farm save barn swallows, and a pair of pewees, who are sure to come home every season, and breed in an out-building undisturbed. We endeavor to protect them from guns and stones. They are as tame as we wish them; and they take off a few of the insects that infest our eyes and ears.

Besides the privation named of the sight and music of those birds, we are sensible of a great increase of insects that infest our fruit trees, and that prey upon our grain and corn fields. We may positively assert, that if birds were increased a thousand to one, hopping over our grounds in search for their food, that there would be a great diminution of those insects amounting to nearly total extinction. There are many that feed on the insects on fruit trees, which if undisturbed, from a common course of nature, would free them from these pests which ruin the fruit. The different species of woodpeckers used to be plenty, which are now almost extinct, from their exposed state, in searching out fruit orchards. The cuckoo is a fine but rare bird; she exposes herself from singing her very melodious songs; also from the circumstance of her particular manner of living, which I believe is wholly on caterpillars. I have seen them light at a new nest and clear it completely.

There are many species of birds which I have not mentioned as to their beauty and usefulness, and some few that are mischievous. My design has been to show that we once were delighted with, and benefited by those birds, and that we are now living in this dreary land, without their company, and without their great benefit. And now I will show that if we choose, we can soon enjoy their company again.

The remedy is practicable, it is only to *legislate in their favor*. To make the thing more perfect, *every state* should go hand in hand. A heavy fine should be laid against those who destroy any birds, except the most mischievous.

TO DESTROY MOLES IN GARDENS.

Collect earthworms, kill them and mix them with the powder of *nux vomica*. After the mixture has remained in a heap for 24 hours, take the worms and place one or two here and there in the routes and holes of the moles. The desired effect is said to be the result.—*Bulletin Universel*.

TO CORRESPONDENTS.

The communications headed "Norfolk, its facilities for commerce, &c."—"Beaufort, or Port Royal, in South Carolina, &c."—"Irish Potatoes as food for sheep"—"On the effects of gypsum near salt water"—"On manures"—"Loss and gain"—"On wild onion, &c."—"On the discovery of green sand [called marl in New Jersey] in the calcareous deposits of Eastern Virginia"—"Apparatus for analyzing marl, and carbonates in general"—"Desultory observations on buckwheat as a green manure, &c." were received too late for this No., but will appear in the next.

The subject of the article on certain laws in South Carolina, is not embraced in the plan of our publication, and therefore we are compelled reluctantly to deny it a place in the Farmers' Register.

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AUGUST, 1834.

No. 3.

EDMUND RUFFIN, EDITOR AND PROPRIETOR.

ON THE DISCOVERY OF GREEN SAND IN THE CALCAREOUS DEPOSITE OF EASTERN VIRGINIA, AND ON THE PROBABLE EXISTENCE OF THIS SUBSTANCE IN EXTENSIVE BEDS NEAR THE WESTERN LIMITS OF OUR ORDINARY MARL.

William and Mary College, June 26, 1834.

To the Editor of the Farmers' Register.

Since my attention was drawn to the nature and properties of the New Jersey Green Sand, by the specimens which you sent me for analysis, and by our more recent conversations on the subject, I have made a visit to the region in which it is found, and have witnessed the most striking evidences of its utility as a manure. During this excursion, I examined the marl in all its varieties, and learned many interesting particulars respecting its use, from intelligent farmers, long experienced in applying it to the soil. I have moreover analyzed several specimens collected on the spot with the view, if possible, of throwing some light upon its agency when applied to the soil.

Since my return, I have made diligent search for this substance in our marl beds and the accompanying strata, and am at present directing my inquiries to that region of Lower Virginia in which, according to geological laws, as well as from some indications of which I have heard, this deposit may reasonably be expected to occur. As far as relates to the marl beds of this vicinity, my search has been unexpectedly successful. With scarce a single exception, I have discovered particles of the green sand, mingled with the ordinary sand, clay, and shells; and in some instances, in so large a proportion as no doubt greatly to enhance the useful agency of the calcareous matter. Indeed, I am inclined to believe, that in some cases, the agricultural efficacy of the marl is chiefly owing to the green sand which it contains. In this conclusion I think I shall be sustained by facts hereafter to be noticed.

The general occurrence of this substance in our marl beds, is certainly a discovery of some interest; and though I may perhaps exaggerate its importance in a practical point of view, I cannot but think that it is worthy of the attention of our farmers. I speak of its *general* occurrence, because, although I have examined but few specimens from a distance, the general resemblance of our marl deposit throughout, together with the almost invariable presence of the green particles in such as I have inspected, would seem to justify the conclusion that it is a usual accompaniment of our marl formation, though by no means in equal proportions in all localities. Out of more than forty specimens which I have examined, there were only two in which the green particles could not be discovered; and as they frequently occur in patches, and not generally diffused throughout the bed, it is probable that even in the beds from which these two specimens were procured, the green sand might be elsewhere found. Some of the most efficient marls in the neighborhood of Williamsburg, contain a marked proportion of this sub-

stance. At Burwell's Mill, (three miles below the city towards Yorktown) the intermixture is so large, that the sand and *detritus* of shells washed down by the spring freshet display a very distinct greenish olive tinge, which even travellers observe as they pass through the valley in which the deposit exists. At this place, the shells, as they are taken out of the extensive bank recently exposed by the torrent, are frequently filled with a dark mass containing as much as thirty per cent. of the green particles. In fact the whole bank is strongly tinged by them and the stratum which overlies the shells, in some places five feet in thickness, is precisely similar to some of the poorer deposits in New Jersey, and contains upwards of thirty per cent. of this substance. In Judge Semple's marl beds, in the same vicinity, the green particles are equally abundant—and, as in the former case, extend into the incumbent stratum of non-calcareous matter. In many instances, this layer of overlying earth has been found even more efficacious on the soil than the subjacent marl—a fact which might naturally be inferred, when the green particles abound chiefly in the upper stratum, from the extraordinary efficiency of the green sand as experienced in New Jersey. But by far the most interesting locality of this substance in point of extent, which I have examined, occurs on the shore of James river, adjacent to King's Mill and Littleton. Here the banks rise perpendicularly to the height of from forty to sixty feet, and for about three-fourths of this elevation are composed of shells and earth mingled with a large proportion of the green sand which in some places imparts a distinct color to the surface. The sand of the beach is also filled with these particles which the rains have washed down, and which, at first view, present the appearance of the common black sand of our river, though in much larger quantity. At Bellefield, and other places on the York river, the banks and beach are similarly impregnated.

The green particles may be readily recognised by their want of lustre, the ease with which they may be bruised with the point of a penknife, and the bright green stain which they then produce. In examining earth or marl in which they are very sparsely scattered, the particles are sometimes difficult to separate from the other matter. My method is to moisten the end of the knife blade by applying it to the tongue, and then to remove several of the particles by adhesion. When placed upon a card and bruised, they leave a brilliant stain. This test may be confidently relied on.

The occurrence of the green sand so extensively through our marl region, affords strong grounds for hoping that valuable beds of this substance, like those of New Jersey, almost entirely unmingled with other matters, may be brought to light by a judicious and enterprising examination of the district on the western limits of our marl. And should such a discovery be made, the agriculture of Lower Virginia would become possessed of a new and powerful auxiliary in furthering its already rapid career of amelioration. Even the fact

that the green sand often exists in considerable quantities in and above our ordinary marl beds, which is I think now sufficiently established, may furnish no unimportant aid in the improvement of our lands, by leading to a more varied and judicious adaptation in the application of our manures.

Independently of the existence of the green sand in a scattered state in our calcareous strata, there are other and stronger reasons for believing that a deposit similar to that in New Jersey will be found in the appropriate region. In a geological arrangement of our various formations, the marl beds of Eastern Virginia and Carolina, as well as those of Maryland, belong to a later period in the physical history of our country, than the green sand formation of New Jersey—the former being referred to the tertiary—and the latter to the secondary epoch of geologists. Now this tertiary deposit extends into New Jersey, and is found in many places in the latter state nearly contiguous to the green sand. Moreover, indications of the New Jersey formation have been found in Maryland—and such is the general regularity with which the different geological deposits are arranged, that we may fairly infer the existence in Eastern Virginia of the green sand, or some deposit equivalent in a geological point of view—though at the same time it by no means follows that the green sand, if actually found, would be sufficiently near the surface to render it extensively available as a manure. The object however is of such magnitude, as to justify a very diligent examination, and I am therefore desirous of enlisting in this research all those readers of the Register who reside in the region which has been alluded to before. As however the success of this investigation will be greatly promoted by an acquaintance with the indications by which the green sand, or its geological equivalents are to be recognised, and some knowledge of the properties and constitution of the substance itself, I shall here give a brief account of the New Jersey formation which I visited, together with the result of several chemical analysis of the sand carefully executed by myself and others: and further to interest your readers in this important inquiry, I shall add a statement of such facts bearing upon the application and agency of the marl, as I was enabled to collect during my visit to the beautiful region which it has so largely contributed to fertilize and adorn.

The New Jersey green sand is apparently identical with that series of deposits recognised in Europe by the name of the green sand formation, characterised by a predominance of minute green particles in many of its strata. In Europe these strata are generally found alternating with beds of chalk; but in this country no chalk is found, unless in the region west of the Mississippi. The fossils embedded in the green sand on both sides of the Atlantic, are however so strictly alike, that the geological equivalence of the American and European beds can scarcely admit of question; and is therefore generally conceded as an established point. It is relevant here to remark that in tracing cotemporaneous or equivalent geological formations in different regions, geologists are accustomed to rely almost exclusively upon the fossils, whether shells, bones, or vegetable remains, which the strata may contain—a procedure to which they have been led by the whole tenor of modern de-

velopements in geology. Now with reference to the New Jersey formation, though it would be impossible without numerous drawings, and much descriptive matter, uninteresting to general readers, to convey a knowledge of even the principal shells and other fossils existing in the green sand, some account of a few of these fossils may possibly be useful in the inquiries which I trust many of your readers will be prompted to undertake.

1st. *Lignite*, or carbonized wood, often associated with iron pyrites of a bright yellow lustre, frequently occurs in the beds overlying the green sand formation, though it sometimes occurs in other situations.

2nd. *Amber* is often found in a similar position, as was the case at the Delaware and Chesapeake Canal.

3d. *Belemnites*—a fossil of a yellow or brown color, in shape somewhat like a cigar, but rather thicker—very brittle, and usually found broken transversely so as to exhibit its tubular character within.

4th. *Ammonites*—a fossil presenting the appearance of a snake coiled up in a flat coil, and frequently large and ponderous.

5th. The *Echinus*, or Sea Urchin—sometimes globular, at other times much flattened, having numerous little warty prominences, and minute perforations symmetrically arranged on its surface, and when entire, occasionally furnished with spines or prickles.

6th. *Gryphaea*—a shell having one valve very deep and convex, and the other flat. It somewhat resembles the small shell (chama) very abundantly found in our marl beds. This latter is smaller—has a rougher exterior, and has two muscular impressions in each valve—whereas the *Gryphaea* has but one.

7th. *Exogyra*—a shell like the former, with one convex and one flat valve—but a great deal rougher and more irregular in aspect, and of large dimensions.

8th. The *Falcated Oyster*—a beautiful shell about one and a half or two inches in length and bent like a Turkish scimeter.

These rude descriptions, which have no pretensions to scientific accuracy, are designed to draw attention to such fossils as may be brought to light in the region in which the green sand may be expected to occur—and in this point of view may prove of real value in examining for that deposit. Of course a scientific inspection of the fossils would be necessary to establish their identity, but this can readily be procured by transmitting them to the Academy of Sciences in Philadelphia, or by sending them to William and Mary, where they would be carefully examined and compared with the New Jersey fossils as collected and described. Indeed there is reason to believe that some of the characteristic fossils have already been found in Eastern Virginia. A bed of *Lignite* has been lately discovered on the Rappahannock, a few miles below Fredericksburg, the very point at which it might be expected to appear, and from information recently received, I am disposed to believe that *Belemnites* may be found near the mouth of Potomac Creek. It has been said also that the *Gryphaea* has been found, but I have not heard in what vicinity. These facts should furnish an additional stimulus to inquiry, and literally no stone

should be left unturned in pursuit of so important a discovery.

The New Jersey green sand is generally found in the valley and meadows, though occasionally it rises to some height in the surrounding hills. Its depth in many places is very great, and several strata occur, separated by layers of shells, or blue clay, or sand colored by iron. The general aspect of the green sand is that of a bank of moist bluish clay—though in some places the green tint is very perceptible. This however only occurs where the earth is dry. When thrown into heaps by the side of the pit, the mass falls into a coarse powder, in texture and color very closely resembling gunpowder, on which account it is very commonly known by the name of *gunpowder marl*. This mass consists in very large proportion of the pure green sand, having a slight admixture of clay, and in many places of minute fragments of shells. Occasionally, the bank presents a mass of the pure green sand itself—and again, in some places the shells predominate. In one of the beds in the vicinity of New Egypt, I discovered small spiculæ of gypsum, or sulphate of lime: but this occurred at no other locality—and in this place the crystals were so minute and few in number as to require the use of a microscope to be seen distinctly. The moist marl when warmed in the hand exhales a strong phosphoric odour, a fact which I believe has not been hitherto remarked.

As already observed, the marl frequently contains shells both in an entire and broken condition. This however is by no means universal. In fact, the great majority of those beds in actual use contain either no calcareous matter, or a very minute proportion of it. This I ascertained by chemical examination. In the vicinity of Arney's Town, Crosswick's Creek, and Shrewsbury, as well as other places, much of the marl which the farmers spread over their land, contains no carbonate of lime; while at New Egypt the calcareous and non-calcareous marls are both extensively employed. The same is true likewise, of the beds farther south at Mullica Hill. The green particles themselves have an invariable composition—and those of our Virginia marl beds are perfectly identical with those of the New Jersey deposit. Thirty grains of the green sand yielded by careful analysis—

Silica,	15.51 grs.
Protoxide of iron,	7.56 "
Potash,	3.10 "
Water,	3.00 "
Magnesia, a trace.	

These results agree very closely with the determination of Berthier of France, and Seybert of Philadelphia. The former operated upon the green sand of Europe, the latter upon that of New Jersey. It appears therefore that the predominant constituents are silica and oxide of iron. The potash, amounting to about ten per cent. is most probably the ingredient chiefly concerned in the agricultural agency of the marl, though in what way its connexion with the other ingredients is severed when the marl is spread upon the land, I am at a loss to conjecture.

Throughout all the district in which this deposit occurs, it is extensively employed in agriculture. In the neighborhood of Arney's Town, one

of the points which I visited, it has been used as a manure for the last thirty years—but its general introduction is of more recent date. In the region in which the marl chiefly abounds, the soil is loamy, having in some places a large intermixture of tenacious clay. East of this tract, which is a narrow band nearly parallel to the Delaware River, the country assumes an appearance very similar to that of the sandy lands of Eastern Virginia, covered with a thick growth of pine, and comparatively unproductive. On both these varieties of soil the green sand is continually used with the most striking benefit. For the clay soils, the more sandy marls are of course preferred; and for the sandy soils, those which contain some clay along with the marl. The proportion in common use near Arney's Town, is from ten to twenty loads per acre. In other places five loads or even less is found to be sufficient. The action of the marl appears to be very permanent, as will be evinced by the following statement. In a large quadrangular field over which I walked, four successive applications of the marl had been made at intervals of four years—commencing about twenty years ago. The first dressing was applied to the north side—the second to the south—the third to the east, and the fourth to the west—while a small space in the centre was left without any marl. All four sides were covered with a very heavy crop of clover, which was nearly, if not quite as luxuriant on the north as either of the other sides—while the space in the middle was almost bare. The action of the marl appears to be most powerfully felt by clover and grass—but it is very conspicuous also with small grain and corn. A very intelligent farmer told me that it more than tripled his clover and grass crop, and doubled his small grain. In general it is spread upon the clover every fourth year, and ploughed in for the next crop. That it is very efficient upon sandy soils is evinced by the following striking fact. Some years ago an enterprising farmer near New Egypt, purchased two hundred acres of the Pine Barren, which, by marling, he has converted into pasture sufficient for one hundred head of cattle. Such is the demand for the marl, even at a considerable distance, that it has become an article of great profit to the proprietors of the pits, and more than one individual was pointed out to me who had risen to wealth by the sale of marl.

From what has been stated it will at once be evident, that the discovery of extensive and accessible beds of this manure in Virginia would be a most important accession to the resources of the state, and that an active and diligent search ought forthwith to be commenced throughout all the region in which there is a probability that it exists. Every aid which it is in my power to give, will be cheerfully bestowed in furtherance of this inquiry: and as I feel the double interest of a scientific curiosity, and a sincere solicitude for the agricultural prosperity of our state, I shall gladly receive all fossils and other specimens which may be transmitted for inspection or analysis, giving them a prompt attention, and communicating in reply such hints as may promise to be most useful in this deeply interesting and important investigation.

WM. B. ROGERS.

A CHEAP AND USEFUL WATER-CART.

From the *British Farmers' Magazine*, [of February 1834.]

I subjoin a description of a very cheap and useful water-cart. A barrel, holding 100 to 200 gallons, is placed on a pair of wheels and shafts in the usual way. A pump, three inches in diameter, is placed close by the side of the barrel, and to the under end of the pump is made fast a leather pipe of indefinite length, with a rose copper end, and in the pipe small copper or tin rings are placed, two inches distant, to prevent the external air from pressing together the sides of the pipe, and thus excluding the water. The cart being placed on the bank of a river, brook, or pond, and the pipe thrown into the water with the rose end immersed, a man will pump 150 gallons in 10 minutes, without the trouble of having a road into the bottom of the river, and with the great advantage of the horse standing dry, and not plunged into three feet of cold water in a winter day, in the usual way of filling by ladle and standish. A stop cock is fixed behind for discharging the water. When the cart is travelling the leather pipe lies over the barrel, fastened by two iron catches.

The barrel being filled, and driven to the place required, the leather pipe is immersed in the barrel by a hole in the top, sufficient to admit the rose end. A small iron rod screws down by the side of the piston rod, upon the upper valve, and shuts it fast. A rising main, with a check valve, is opened between the two buckets in the pump, upon which is screwed fast a leather pipe with a copper tube on the end. One man directing this pipe, and another pumping, converts the cart into a sort of fire engine, that may be very useful in cases of emergency, throwing the water 40 feet horizontally, and over any house of two stories, any hay stack or corn rick, and also very useful for garden walls and fruit trees. By increasing the size of the barrel, and by applying more power, a very sufficient engine may be made, and answering other purposes at the same time. The above described is very simple and cheap, and is very useful.

JOHN DONALDSON.

ON REAPING WITH THE SCYTHE.

[It is not only interesting, but profitable, to compare our own opinions and practices with those of other farmers having the same general object in view, but placed under very different circumstances. For want of making such comparisons, we fall into one of two errors, which are directly opposed to each other. We sometimes refuse to copy a plan adopted in England, for example, because we consider the difference of existing circumstances renders it altogether unsuited to our use; and in other cases, we assent without dispute or examination, to the superiority of some process in that country, because the operations of agriculture there are in general so much more perfectly performed, when perhaps in truth, our own labor saving substitute is preferable, and would be adopted by English farmers, if the same want of means for comparison had not kept them even more ignorant of our improvements than we are of theirs.]

The piece which we will present below, furnishes a striking illustration of the ignorance of both countries

of the practices of each other. The cradled scythe which the scarcity of labor, and the former general lightness of our crops of wheat, forced us to adopt in the United States, instead of the English sickle, or reaping hook, and which has become so perfect an implement by successive improvements, has never been known in England. But, it has been supposed by us that this rejection of this implement so indispensable here, by British farmers, was a proof that their mode of reaping wheat was still more perfect than ours; and that if we could command enough hired labor in harvest, and at as low wages compared to the value of the crop, that we would profit by exchanging our scythe and cradle, for the English sickle. But it seems that our mode would have been preferred by English farmers if they had known it, and that they are now beginning to adopt, as a new and valuable improvement, a mode of reaping similar to ours, but (as we infer) still greatly inferior. The Hainault scythe (alluded to below) which Sir John Sinclair saw used in Belgium, and the introduction of which he strongly urged in England, was formerly used in New York, where it had been brought by the early settlers from the Netherlands, but was abandoned for the scythe and cradle. The scythe described in the following article is connected with a sort of a cradle, but certainly very inferior to ours. We omit the plate, but can make its form perfectly understood by referring to our cradle, which is familiar to every reader. The sned (or snead) has a handle for the left hand, as well as one like ours for the right. The blade is perfectly straight except at and very near the point, in which short distance the curve is much greater than in our blades, which curve gently throughout, and mostly towards the point. To our eyes, the English blade would seem totally unfit for its purpose. The fingers are only three in number, and would be precisely represented by the three fingers next the blade of one of our cradles being cut off, so that the lowest was left only one third the length of the blade, the next something longer, and the third (and most distant from the blade,) about half its length. They are all straight. They are unfit to catch and hold the cut wheat as do our cradles of five or six curved fingers nearly as long as the blade. But even this addition is objected to in another and later article which is in the succeeding No. of the *Quarterly Journal of Agriculture*. This states that—

"About 30 years ago an attempt had been made, (in 'Aberdeenshire') and persisted in for two years, to cut the 'corn crops with the scythe; but as a notion had been then 'entertained, that it was indispensable, for 'laying the 'ears even, to attach some sort of additional machinery 'to the common scythe, and which was attempted in the 'form of a comb or heckle projecting above the blade, 'the scheme became abortive, owing, as experience 'now teaches us, to that very notion; and all thought 'of employing the scythe for harvest work passed 'away, till it was again revived at the time above 'stated. The implement now employed is just the 'common scythe, universally in use over the kingdom 'for cutting grass and clover-hay. No change whatever is made in it for cutting heavy or lodged grain-crops; but for light standing crops, a very simple addition is found of advantage. This consists of a small 'rod or shoot, nearly an inch in diameter, of green 'willow, or rowan or broom, or any other flexible and

'tough young wood. It has its thick end twisted into the small iron rod, which aids in attaching the blade of the scythe to its handle, named provincially the 'grass-nail. Its small end passes over the upper side of the blade as far as the back, where it is bent upwards in an even curve, and is brought backward, and tied with several rounds of strong twine to the handle, about 15 inches above the blade. A piece of strong iron wire is sometimes substituted for the willow rod; but the latter is more approved of, being more easily adjusted to the nature and lay of the crop, according to the judgement of the scythesman."

From this passage, it seems that in fact the British reaping with the scythe approaches in simplicity the mowing of grass: and if so, and the wheat can be laid straight enough to be saved well, there would be a great advantage found in exchanging for that mode, our cumbrous and expensive scythe and cradle, however superior it may be to the sickle, or the implement described in the following article.

We have omitted those portions of the piece which do not relate specially to the operation of reaping.]

From the Quarterly Journal of Agriculture.

It is certainly a remarkable circumstance in the history of mechanical science in this country, that the art of cutting down the cultivated crops should be so inadequately supplied with instruments. The tools which are employed in every other art evidently display an ingenious adaptation of means to an end. Not so the reaping-hook. Unlike every other mechanical instrument, it is the physical power and dexterity of the laborer alone which constitute the efficacy of the reaping-hook. Its extremely simple form cannot alone have prevented the invention of a substitute. The knife and the spade are as simple in form as it; and yet the former has been displaced by many mechanical contrivances to which the power of steam is applied; and the latter is insignificant, when compared to the plough moved by the power of the horse, in every operation of magnitude in the field. Like the spade, the reaping-hook may be useful in the minutest and lighter operations of the garden; but its continued use in the field is attended with immense loss of time and money. It is nevertheless an efficient implement for executing good work in the hands of the dexterous laborer; though there is no single operation in farm management which is attended with the annual outlay of so much money, and the waste of so much valuable time, and so dependent, at the same time, on adventitious aid, as the reaping of the culmiferous crops. The expense incurred at harvest-work with the reaping-hook is seldom under 12s. an acre. Judging only by the magnitude of the work, it might surely be executed by horse or steam power for a third of that sum. One hundred acres of corn costs an outlay of money to the extent of £60 a year for reaping. Of this sum, £45 a year is expended uselessly; and which in the course of nineteen years' duration of a lease, with the simple interest thereof, would amount to nearly £1000—a sum which, if saved would purchase many comforts for the declining years of life. We say this sum is expended uselessly, for it is generally carried off by strangers. The time, too, which the reaping alone of the corn occupies is generally three weeks—a period much too long for the precious fruits of a twelve-

month's toils to be exposed to the vicissitudes of a variable climate.

These difficulties were long felt, without being attempted to be remedied. Attempts, however, were at last made to substitute machines driven by horses for the reaping-hook. They have not yet been crowned with success, though they have no doubt laid a foundation upon which some future contriver, more ingenious than the rest, may erect a simple and useful structure.

Simple as the reaping of corn appears to a spectator, it is in reality a very troublesome sort of work. The cutting it down by the ground is not the only consideration which is required. All the manipulations which the corn has to undergo in future must be, and can only be, facilitated at harvest. It must be bound up into sheaves, for the convenience of transportation. It must be exposed in small portions to the sun and wind for a time, before it can be safely preserved in large quantities; it must be carried off in small quantities at a time from the fields to a more convenient place to be preserved, and to pass again through hands in the thrashing and cleaning process, before it can be made available to the consumer. That machine must be very ingeniously constructed, indeed, which can prepare a crop of corn for all these successive but necessary manipulations.

Our surprise may therefore be a little abated at the hitherto unsuccessful attempts in the construction of reaping machines, when we consider the nature of the work which they have to perform. Though much ingenuity has been displayed in both Mr. Bell's and Mr. Mann's reaping-machines, they cannot, it is evident, realise all our expectations on that subject. That of Mr. Bell cuts the corn so surely, that not a single straw can escape; but it does not lay the swath of corn, when cut, in a direction at right angles to the line of draught, which it must be made to do before the corn can be taken off the ground in the best and most expeditious manner to be bound into sheaves. It appears to us to require considerable power to move it; and it certainly requires more dexterity to manage its motions than the generality of ploughmen possess who have the charge of farm-horses. Mr. Mann's machine lays the corn at right angles to the line of draught, and therefore more perfectly than Mr. Bell's; though it is questionable, if it will be able to cut it so surely. Mr. Mann's appears to be as easily moved with one horse as Mr. Bell's is with two. Mr. Mann's has not yet received a fair trial. Would a combination of the best parts of the two machines effect the cutting and laying down of the corn in a satisfactory manner?

But however well these may be simultaneously accomplished by the same machine, no reaping-machine can be said to approach nearly to perfection, that only reaps, and lays down the corn when cut in a swath; but which does not collect the corn into bundles, ready to be bound into sheaves. Farther than this it is perhaps beyond the power of machinery to accomplish in this kind of work, though short of this no mechanician should rest satisfied with the capability of his reaping-machine. The making of bands, the binding of sheaves, and the setting of stooks, must be confided to manual dexterity. The locomotion necessary to a reaping-machine, when in the per-

formance of its work, will always present an obstruction to the perfection of its construction; though many greater mechanical difficulties have already been surmounted by our ingenious artisans. An insurmountable difficulty will sometimes be found to the use of reaping-machines in the state of the growing corns. A portion of it may be standing erect, or only a little swayed, while others may be twisted and laid flat in every possible direction. High winds and heavy rains may ravel and beat down a whole crop in a single day. With the corn in that state it will be impossible to derive much assistance from the reaping-machine. Fortunately a laid crop is not of very frequent occurrence, though, to a partial extent, portions of laid corn will be found on every farm in every season. To reap three-fourths, or even one-half, of the crop with efficient reaping-machines will insure a considerable saving, though the laid portions may have to be reaped with the sickle.

Until the appearance of an efficient reaping-machine, much saving of money may be effected in reaping by the substitution of the scythe for the sickle. The scythe has long been in use in agriculture, and powerful as the implement is in the hands of the laborer, in comparison with the sickle, it is surprising it has not been more used at harvest-work in this country. It is used in France and Switzerland, in many parts of England, and in Aberdeenshire. The Hainault scythe takes up an intermediate position between the scythe and the sickle. The scythe can only be wielded by stout men, and whatever work is performed by it requires the assistance of laborers besides the mower. These circumstances have no doubt had the effect of restricting the use of the scythe. On the other hand, every boy and girl, as well as grown up person, can assist at harvest-work with the sickle.

The land must be prepared by rolling for the use of the scythe. Clods and stones soon blunt and break the edge of the scythe: the roller should be heavy. All stones which are not compressed into the soil by the weight of the roller should be removed, and this is easily accomplished by mounting a box on the frame work, into which the man who drives the horses can throw the stones if they are few in number, or should they be numerous, another person can follow the roller and lift them up. The stones can be disposed of at the ends of the field. The best time to carry off these large stones is when the field is preparing for the crop which is to be rolled. Rolling the whole crop imposes, it is true, additional labor in spring; but it is absolutely necessary when the scythe is to be employed in reaping. Wheat is generally rolled at any rate after the grass-seeds are sown in it in spring, and most people prefer rolling the barley after it is sown, in order to make as smooth a surface as possible for the braird of that kind of grain, so that the additional labor only consists in rolling the oats. It is always advantageous to roll oats early in a dry season to prevent the ground becoming too dry, for of all the culmiferous crops the oat is most affected by drought.

The scythe employed in reaping corn requires more nicety in the construction of its several parts than one for common purposes. The blade should be of patent steel, strengthened by a plate of iron

along the back, and its temper should not be too hard, which can be determined by examining closely the edge of the blade, and observing that it is smooth and not serrated. A good mower always prefers a long blade, more than four feet in length. The shank or sned should always be straight and not curved. The curved may seem more convenient in form to the hand, but as the line of draught must always be straight, the straight sned always gives the greatest command over the scythe. A well dried young larch tree, barked and reduced by the plane to the desired thickness, with a natural slight curve outwards at the root end of the tree for receiving the blade in a proper position, makes the best sned for reaping. When painted, such an one will last for many years. A hone of fine sand to preserve a fine edge, and a fine sandstone to whet the edge of the scythe occasionally, are necessary appertences. To gather the corn and lay it down in a regular swath when cut, a simple apparatus called a rake or cradle is attached to the scythe. This rake, as its name implies, consists of three long teeth, diminishing in length from the uppermost to the undermost, fastened to an upright stem, and strengthened by two rods passing through them parallel to the stem. It should be wholly made of the finest ash, and as light and slim as the strength of the wood permits. The upper tooth should be two feet or a little more in length, and that of the other two, each three inches shorter than the one above it; and all of them curved similarly to the back of the blade of the scythe. The stem of the rake is driven into a socket of iron, but not fastened to it with a nail; the socket has a wedge-shaped toe kneed at right angles to it, in the direction of the teeth of the rake. It is fastened to the sned so as to stand in a perpendicular position when the scythe is to be used, with the same iron ring and wedges which fasten the blade and sned together. The rake stands with the socket about thirteen inches in height, and the spaces between the teeth and the undermost tooth and the blade of the scythe, are about four inches. The adjustment of the scythe consists in placing the blade in such a position as that its point shall be as far from the handle by which the mower supports the scythe in his right hand, as the length of the blade itself, and as this handle is from the butt end of the blade. In short, the butt end, and the point of the blade, and the right-hand handle, stand in the angles of an equilateral triangle, the edge of the blade for reaping, should not be so low set as that of the scythe which gardeners use for cutting grass walks, nor so high as for the cutting of clover. The left-hand handle is placed the distance of the elbow to the extremity of the middle finger of the man who is to use the scythe from the right-hand one. The right-hand handle should be curved and placed on the sned, so as the scythe should be suspended in a working position: both are fastened in the tightest manner to the rings which slide on the sned, by the shank of the rings passing entirely through their length and rivetted. The hone is hooked on with two nails at the upper extremity of the sned; the sned is about seven feet in length, and is shod at the upper extremity with a socket and pike; the pike when inserted into the ground serving to render the scythe steady in the act of whetting. A strong cord is requisite from

the outward rod which strengthens the teeth of the rake to a nail in the sned, a little below the right-hand handle, to serve the double purpose of keeping the rake in the desired position, and of laying the corn over in swath. Thus equipped, the reaping scythe should balance itself exactly on both sides of the right-hand handle.

The relation of these minutiae will not, we hope, be considered tedious, for upon the proper adjustment of the component parts of a scythe depends in a great measure the success of reaping the corn neatly and quickly. Reaping with the scythe is hard work under any circumstances, but attention to minutiae relieves it of irksomeness. * *

The best position of the corn for reaping with the scythe, is the upright, or a little swayed, either naturally, or by the wind from the mower. The best direction to reap in respect to the ridges, is across. The ground is then always straight for the stroke of the scythe, and the furrows of the ridges are easily cleared. In commencing to reap a field of corn, a little consideration is requisite. The general position of the corn over the whole field must first be considered, then the quarter from which the wind blows, and, lastly the direction of the ridges. If all are favorable, the work will proceed cheerfully, if not, a compromise must be made with the opponent. The wind must be always in the back or on the right-hand of the mower. A strong wind will sometimes overrule the natural position of the corn. A diagonal direction across the ridges should always be preferred to one along them. At whichever side of the field operations are to commence, that side must be entirely opened up by cutting down a breadth of corn in the line of the ridges, equal to the whole band of mowers. This cleared road-way gives access either across or in a diagonal direction over the ridges.

To carry on the reaping in a regular manner, it is necessary to classify the mowers into bands of two each, according to their ability, that each band may be equally dexterous. Two inexperienced or weak-bodied mowers ought not to be together, as they will assuredly cause a hinderance to the work, at one time or another. Let a steady good mower take the lead of the first band, and let each band keep its leader and people and place of precedence ever after, otherwise confusion of work and wrangling among the mowers will inevitably ensue.

Every band may be arranged in this manner: two scythe-men to reap; a person, generally a woman, to follow each scythe, to make bands and take up the corn, and place it in the bands in bundles ready to be bound up; a bandster; always a man, follows the women, and binds the sheaves; the two bandsters set up the corn together into stooks; a woman follows the whole with a large rake, and clears the ground of any lose corn, and brings the rakings to the bandsters, to be bound up in the sheaves or by themselves.

Some people place three mowers in a band, and in this case there will, of course, be three takers-up and three bandsters, and a man to rake to the three instead of a woman to rake to the two scythes. There is, we believe, a saving of wages by this arrangement, as the wages of women are nearly as high as those of men at harvest-work. But by the former arrangement, we are sure there will be less loss of work and time, in case

any accident befall the scythe, and accidents will occasionally happen to scythes in the hands of the most expert mower.* On small farms where three mowers are able to reap the whole crop, the latter arrangement may be beneficially adopted.

Suppose, then, that two mowers and their people form a band, and suppose there are three bands engaged at harvest, they should arrange themselves by these circumstances. Sixty yards is as much space of corn as a scythe can cut easily at one sharpening, and that distance is about as far as most men can cut at a breath. Twelve ridges of five yards each, or ten ridges of six yards, will thus mark the breadth to be cut at once. Let the foremost or leading band start first to the cutting of the sixty yards, whilst the other are preparing to follow; let them then sharpen their scythes, and proceed forward other sixty yards; and while they are doing so, let the middle band commence, and they will cut their sixty yards in the same time in which the foremost band will have cut their second sixty yards: let both bands then sharpen their scythes at the same time. When both are ready to start again, let them continue to cut onwards, each its sixty yards, while the last band commences cutting its first sixty yards, which, when accomplished, all the bands will be in their respective places, which they must continue to occupy till the breadth of ground which they occupy shall have been reaped of its corn along the whole field, provided there is no extraordinary interruption from the peculiar state of the corn. In this manner, the band which occupies the advanced position falls back, and takes up the space which has just been abandoned by the band immediately behind it. No interference can thus take place among the different bands, while the one serves as a check upon the other, both in the marking of the time, and the quantity of corn reaped by each. A band losing time in cutting out its sixty yards, will cause delay by preventing the band in front of it entering its proper ground. A band losing ground, by lessening the width of the stroke of the scythe, will deprive the one before it of its legitimate width of stroke. Should laid corn or a stronger part of the crop interfere with one band more than another, it is requisite that the band before or behind it, should advance or fall back the breadth of one ridge or more if necessary, in order to equalise the time among them.

To ensure good work in reaping with the scythe, it is requisite to preserve a keen edge on the blade, and always keep the heel of the scythe close to the ground. The keen edge is best preserved by a broad "cannel" or chamfer, on the upper edge of the blade, and narrow one below, and which should be sharpened by always moving the hone or whetstone from the heel to the point, because the cut upon the straw is made by moving the scythe from the point to the heel. Many able mowers cannot preserve a keen edge on their scythes, because they are not aware of the necessity.

* In case of accidents, a hammer, a few stout nails, a spare iron wedge or two, bits of cord, and pieces of old hard shoe-sole leather, should always be ready in the field; and even a rough file, to rub down the point of a scythe, should it break against a neglected stone; till it can be properly adjusted on a grindstone, may prevent a considerable loss of labor.

ty of attending to the difference of the chamfers on the upper and under edges of the blade, and through this ignorance, they move the hone or the whetstone both up and down the blade, thereby counteracting with one stroke the good effects of the previous one. The hone, if kept dry, will always preserve a keen edge on the scythe, with the assistance of the whetstone once or twice a-day. It is great work to cut constantly a width of seven feet and a-half, and from ten inches to one foot in breadth at every stroke. We have often observed a particular man, however, cut eight feet in width and fifteen inches broad at every stroke with apparent ease, and this without any stimulus, and without even knowing that we were watching his labors. He was by no means a powerful man at any, but very dexterous at every kind of field-labor, and he was a striking example of the superiority of science over physical strength. He was desirous of working with a scythe, at least four and a half feet in length.

The rake attached to the scythe requires a position differing with the nature of the crop. When the crop is an average one, it should be placed in a line with the back of the blade of the scythe; when a strong one it should be kept within the blade, and when a thin one it should be projected a little beyond the blade. These necessary changes in the position of the rake for collecting the severed corn in a proper manner, will explain the reason why its stem should not be fastened with a nail into its socket. The momentum acquired by the scythe carries round the dissevered corn, and the cord which stretches from the rake to the sned directs the fall of the corn into the swath. The straws of the corn should be parallel to one another in the swath, and the direction of the swath should be at right angles to the line of motion of the mowers.

The corn from the swath must be carefully placed into the bands, and if any of the straw is by accident disarranged by the scythe, it should be adjusted. The taker-up must also be careful in placing the bundles of corn square upon the bands, so that the sheaves would be balanced when tied. Inattention to this necessary arrangement may not only cause much hinderance to the bandster in its adjustment, but trouble to the person who forks the sheaves into the carts which convey them to the stack-yard. In the act of lifting a sheaf with the fork, the most advantageous hold is obtained of it at the band or tying, and if that is not so placed as to balance the sheaf when lifted, the forker has little command over his object. Each taker-up may make bands to herself from the loose corn as they are required for the bundles; but as this operation would be rather too tedious at that time, it is advisable for the takers-up and the bandsters together to make a sufficient number of bands from the loose corn when the mowers are sharpening their scythes, and lay them down regularly near the side of the standing corn to be next cut, within reach of the foremost taker-up, who can easily hand over every other band to the taker-up behind her. With a good crop the mowers will keep the takers-up and bandsters hard at work, with their best exertions and happiest expedients.

When reaped with the scythe, corn cannot be put into too large sheaves, provided they are not larger than they can be wielded without much

difficulty. The largest sheaves of oats reaped with the scythe will, in general, be ready for the stack in eight days. Large sheaves clear a field with few liftings, and they advance the construction of a stack at a rapid pace. We are quite aware that large sheaves of corn reaped with the sickle are very detrimental to the progress of gathering in the fruits of the earth, and, of course, we would not recommend the same practice in regard to them as we can safely do in regard to corn reaped with the scythe.

The bandsters ought to bind the sheaves very tightly, the large sheaves shrinking considerably in the drying. The bottoms of the sheaves should be trimmed of all superfluous straws. The stooks should be set exactly in the direction of north and south. In that position they derive the greatest advantage of sun and air combined, to dry them in the shortest time. Twelve sheaves of oats and barley, and fourteen of wheat, form a stook, with hood-sheaves. In dry weather wheat is seldom hooded. A little space left between the sheaves will greatly facilitate the drying of the stook, by the free admission of air.

The raking process cannot be expeditiously enough performed by a common hay-rake. The head of the corn-rake should be made of fine ash, as light as possible, but strong enough to bear the driving in of a number of iron teeth; and it should be at least five feet in length, and feruled with iron at both ends. The teeth should be seven inches in length, and four inches apart, and so curved at their points as that the weight of the rake may rest upon the curve, with their points free from the ground, when the rake is held in a working position. The points of the teeth should be thin and broad. The shank of the rake may be of light fir, and fully six feet in length. An iron rod passing from the shank on each side to the head, will prevent the latter being twisted out of its position. A short handle, like the left-handle of the scythe, and fastened at a convenient spot on the shank with an iron wedge, will facilitate the passage of the rake over the ground. The principal duty of the raker is to clear the ground passed over by the bandsters, and to bring the rakings quickly up to them. The rakings are most easily got rid of by pushing the rake with both hands backwards, in a nearly horizontal position. The labor of raking depends altogether on the state of the crop. The straw of a good crop adheres together, and of course little of it straggles away to be raked together; but a scanty crop produces abundance of rakings. Barley generally leaves more rakings than any other kind of crop. It is more difficult to rake upon new grass, such as in reaping wheat and barley, than on a clean stubble, as of oats. * * * * *

Although it is impossible to lay over very laid corn in a regular swath with the scythe, the corn can be cut with it fully more perfectly in regard to leaving a neat stubble than with the sickle. In such a case, the taker-up has the most difficult task to perform. Rank grown laid corn, with its supple straw, presents a formidable difficulty to the bandsters in the setting the unwieldy stooks. The additional quantity of straw obtained by reaping with the scythe is very considerable.

All sorts of grain may be reaped with the scythe. Oats make the most perfect work, with the greatest ease to all the laborers. Barley with new

grass is not difficult to cut, but the clammy juice from the barley-straws lubricates the scythe with a viscid coating like varnish, which must be rubbed off frequently with the whetstone. The bandsters have always hard work among barley. Wheat is beautifully laid in swath when mown. The takers-up and bandsters have less labor among wheat than the mowers, who must be powerful men to continue a length of time at the work. Indeed some farmers, who use the scythe pretty extensively in harvest, reap the wheat with the sickle. There is no necessity for this change. Men can reap a strong crop of wheat with the scythe as well as the other kinds of grain, provided they are not kept day after day at it for a length of time. Their physical energies could not withstand the fatigue. But there are modes of equalizing this labor, and of course of diminishing the fatigue. For example: When a field of wheat and a field of oats are nearly ready for reaping, it is an excellent arrangement to reap the oats in the dewy mornings before breakfast, or as long as there is any dampness on the corn, and then to go to the wheat, or to the barley if there be little wheat on the farm, during the dry period of the day. By this plan much valuable time can be saved in reaping the whole crop. Oats are not the worse by being reaped in a damp state. It is a remarkable fact, that oats reaped in a damp state with the scythe will be nearly as soon ready for the stack as when reaped dry. Not so with barley. Stooks of oats which are reaped dry, but have afterwards been soaked with rain will be longer of being ready for the stack than oats that have been reaped in a damp state. It is a still more remarkable fact, that damp oats reaped with the scythe will be sooner ready for the stack than would the same oats reaped in a dry state with the sickle. Oats reaped with the scythe will be quite ready for the stack in eight days, whereas oats reaped with the sickle require at least a fortnight; and stooks that have been reaped with the scythe will avert much more rain than those reaped with the sickle. We remember a remarkable instance of this, and have repeatedly witnessed the facts mentioned above. After a quantity of potato-oats had been cut down both by the sickle and the scythe in the same field, an uninterruptedly heavy rain fell for three days. We expected the rain to have soaked through every stook. When they were examined, however, after it failed, the stooks which were reaped with the scythe were only wetted on the outside, and every sheaf was quite dry in the heart; and they were ready for the stack in a short time after; whereas those which had been reaped with the sickle were not only soaked through, but they had all to be loosened out to the sun and wind before they could be stacked a fortnight afterwards.

This difference, strange as it may appear, is not difficult to be accounted for. Corn reaped with the sickle, being gathered firmly in the hand, its straw in the sheaves becomes as it were a bundle of parallel rods; between which the rain easily enters, and passes among them into the half-crushed straw in the heart of the sheaf, where it lodges as if in a sponge, and where little air can penetrate to evaporate moisture. On the contrary, a sheaf reaped with the scythe is always in an open and loose state through which the wind can freely pass; and its outside coating consists not so much

of a bundle of parallel rods, as of a kind of network of straw, the several threads of which direct the rain to some projecting piece of bent straw, which serves as a spout to throw off the water from it to another till it reaches the ground. These tricklings of water from point to point we have often observed along the sides of the stooks which were reaped with the scythe, with a curious satisfaction. In other stooks, the dropping of water is almost always confined to the lower ends of the hood sheaves; the side sheaves, from the circumstances already mentioned, and their inclined position, absorbing most of the rain which falls against them.

OPINIONS ON SALT, AND CARBONATE OF SODA, AS MANURES.

The last No. of the British Farmers' Magazine (for May 1834) which we have just received, contains a review of a new pamphlet which has the following title:

"An Address to the Owners and Occupiers of Land in Great Britain, &c. on the Important Discovery of the Decomposition of Common Salt, for the purposes of Manure; whereby an Acre of Land is prepared for the reception of any crop, at the cost of Ten Shillings only. By Henry Kemp."

The substance obtained by the decomposition of common salt is doubtless the carbonate of soda, an alkali having very nearly the same properties with the carbonate of potash, which constitutes the principal value of unleached ashes as manure. There can be no question, but that this substance would be very efficient as manure: if it could be obtained from salt (which is a compound of muriatic acid and soda,) by a process sufficiently cheap—but the author does not disclose the process which he has discovered, and therefore his publication conveys no available instruction on that head. It is therefore, not so much to announce this supposed discovery that we refer to the publication, as to present to our readers the concurrent opinions of the author and his reviewer, of the worthlessness of salt itself as manure—of which such wonderful effects have been reported from time to time. The reviewer says:

"Of the use of salt, in an unprepared state, as a manure, we have always held a most contemptible opinion. True, it is, much has been written in its praise, but we have, hitherto, failed to meet with any person who really thought it worthy of a second trial."

The following quotation from the author exhibits his opinions in this respect:

"My only object in this investigation, respecting the value of *unprepared* salt as a fertilizer, is the elucidation of truth; and, I am sure, no lover of it will find fault with my exposition, though it may induce him to think less favorably of salt than he did before. That there are many persons who entertain a good opinion of it for its manuring qualities, I very much doubt; for, I have never conversed or corresponded on the subject with any one who has materially differed from me in this respect. I know many farmers who have submitted it for trial on a variety of crops, and who have expressed their disappointment at the results. It was in consequence of the great dissatisfaction which I experienced, after repeated experiments to ascertain its efficiency, that I was induced to attempt the decomposition of it; and, for the complete success

which attended my efforts I am indebted to the failure of all those hopes I had previously entertained, that salt had only to be applied to the ground, to establish an important character as a great fructifier of it. I beg to repeat, that the idea of decomposing salt for agricultural purposes first suggested itself to my mind, from the disappointment that ensued on using it in its *natural* state. Influenced by a sanguine expectation that great good would attend its use, I commenced trying it, on a great variety of crops, immediately on the duty being removed in 1824. I employed it in quantities of from eight to sixteen bushels, applying it at different seasons of the year, and on soils exhibiting every variety of texture, from a retentive clay, to the lightest sand; and, from the minute attention which I paid to these trials, I can confidently state, that no good effects resulted worth notice, excepting, perhaps, to the potato crops; on these it was thought to have done a *little* good, but certainly nothing of a *striking* character."

COMPARATIVE ESTIMATE OF BUCKWHEAT
AND RED CLOVER AS GREEN MANURE—
HUSBANDRY OF THE VALLEY OF VIRGINIA.

Rockingham, June 16, 1834.

To the Editor of the Farmers' Register.

In sending to you my second years' subscription for the Farmers' Register, I have annexed some desultory remarks, principally upon the subject of buckwheat as a green manure. I have not observed in any of the communications on this subject, published in the Farmers' Register, that property ascribed to buckwheat, which in my estimation, constitutes its chief value in the improvement of a farm; that is, its tendency to cleanse the land of noxious weeds, blue-grass, briars, &c. Of its value as a green manure, I do *not think highly*. In this respect I differ wholly with your correspondent who in your 8th No. (I believe, for I have not the No. before me) expresses the opinion that an equal amount in value in clover seed, buckwheat and plaster, would at the end of the first year with the buckwheat (two crops being plastered and ploughed in) benefit the land as much or more than the clover would do (manage it as you will) at the end of the second year. I have certainly never made any experiment merely for the purpose of testing the relative merits of buckwheat and red clover, as agents in fertilizing the soil, though I have several times used the former, and all my life (as a farmer I mean) been in the constant use of the latter, with the view both to pasturage and the improvement of the land—and am very decidedly of the opinion, that upon my land at least, (generally a sandy loam) the buckwheat (manage it as you may) cannot impart one-fourth—perhaps not a tythe of the fertility to the soil that the clover would, if properly managed. From the results of my several experiments, I believe, that upon such a soil as mine, (it might perhaps be different in stiff, hard, clay lands,) a piece of land well set in clover, and having a proper dressing of plaster of paris would derive more benefit from the roots and stubble of the clover (when the first crop had been mowed for hay and the seed saved from the second crop) than any quantity of buckwheat straw, that could grow upon and be ploughed under in one season, could impart to it. But whilst I believe that there can be but little comparison between the value as green manure, of buckwheat and red clover,

(when it is sown upon lands in a proper state for the reception of the seed) I do not mean to depreciate buckwheat: on the contrary I think it a valuable auxiliary in the improvement of our lands. Judiciously used, it would be an excellent pioneer to the introduction of clover into lands that are too poor, or too foul to produce it without the aid of manure, or some cleansing crop. I have found it valuable in subduing a stubborn blue-grass, and in preparing lands so infested, for wheat. This blue (or as it is sometimes here called wire or iron) grass, frequently dispossesses the clover in parts of our fields the second year that they are in clover, in which case it is frequently extremely difficult so to prepare the land for wheat as to prevent the encroachments of this grass in the spring. I have often seen fields of wheat, sown on a clover lay, almost totally destroyed by it. Last year a small part of the field that I cultivated in corn (say seven or eight acres) had become completely sodded over with it. The field had been in wheat the year before, sown on a clover lay, and this nuisance had sprung up, and diminished the product of the wheat at least fifty per cent. upon this spot where the grass had supplanted the clover the year before. Upon this spot, instead of planting corn, I determined to sow buckwheat, (say a bushel to the acre, about the last of May.) It produced a very heavy crop, which, when in full perfection I had rolled down and ploughed in. The whole field is now in wheat: where the buckwheat grew scarcely a spire of blue-grass appears; whilst in some of the corn lands adjoining, though it had been well cultivated with the plough and hoe, and particularly so where any of this grass appeared, the grass is by no means so completely destroyed. It may perhaps also be proper to remark, that this grassy spot had also been somewhat infested with sassafras bushes. None of them grew with the buckwheat, nor do they yet appear in the wheat. But as this is the only piece of my land that is infested with sassafras, and this the only experiment upon it, I cannot pretend to determine whether they are permanently destroyed or not. From this experiment, and others previously made, I am satisfied that buckwheat is valuable in preparing foul land, for wheat; but all my observations concur in proving (to my mind conclusively) that its capacity of imparting fertility to the soil can scarcely bear any comparison at all with that of red clover.

In the case above stated, the crop of buckwheat was so luxuriant, that several of my neighbors declared it was a pity to plough it down; and yet there is not much superiority in the wheat on this spot over that on the adjoining corn land, while it is decidedly inferior to every other part of the field, which contains about eighty acres. Buckwheat when suffered to stand until it ripens the grain, is a very great exhauster indeed—and the straw, when dry, is of less value for manure than any other vegetable substance that I know of, (hemp shoves only excepted.) When ploughed in as green manure, the land should be well compacted with a heavy roller passed over it more or less frequently, according to the looseness of the soil, otherwise it renders the ground entirely too spongy for wheat, and more especially if clover seed is intended to be sown with the wheat, the roller is almost indispensable. But the growth of the clover seed may be ensured by the use of

the peg roller, (an implement used in Albemarle, and made in the common manner, with strong pegs five or six inches long inserted into the roller with a 1½ or 2 inch auger at intervals of six or eight inches each way.) Upon very light and loose soils this implement is almost invaluable. By its use a gentleman of this county last year succeeded in getting a piece of very light loose sandy bottom remarkably well set, where every previous effort to get it in clover had failed.

The business of farming in this section of the state is very much blended with that of grazing. Almost every farmer is to some extent also a grazier; and hard grazing may, I think, be said to be the bane of our agriculture. With a soil generally admirably adapted to the growth of clover and to the action of plaster, the benefits of the system are in many instances entirely neutralized by the injudicious practice of close grazing. Upon farms in a good state of fertility, grazing may, I think, be carried on to some extent without injury, and indeed consistently with the gradual improvement of the soil. But it is often difficult to resist the temptation of the immediate profit of grazing as many cattle as can possibly be made fat on the land. With a view to this double business, my farm is conducted upon the five field system,—the rotation of crops being—1, wheat on a clover fallow—2, corn after wheat—3, wheat in corn land—4—5, clover. The clover is always plastered the first year after being sown, and the first crop mowed for hay. The seed of the second crop is saved; next year it is grazed in the early part of the season, and in the fall the field is fallowed for wheat. My plan is to plaster all my wheat in corn ground with a bushel to the acre, of a mixture of equal quantities of gypsum and leached ashes, which answers the growth of the clover seed, which is always sown upon my corn land wheat fields. This practice pursued for several years past has satisfied me of the error of the opinion which generally prevails in this section of the state, that plastering wheat in the spring retards its ripening, and thereby increases the danger from rust. On the contrary, I am satisfied that plaster when sown early in the spring, instead of checking, really advances the maturity of the wheat. Plaster here costs us from 12½ to \$15 the ton in the stone; and upon any of my land (the river low grounds perhaps excepted) a dressing of a bushel to the acre will always at least double, and upon the thinner parts of the farm, quadruple the product of clover. I have been for some time contemplating very seriously the change of the five for the four field system, and abandoning the habit of purchasing western stock cattle for the purpose of grazing. The four field system will have this very great advantage over the five field—that as the clover will stand but one season, there will be much less blue-grass, and green sward with the clover when it comes to be fallowed, and the land can then be so much more easily ploughed, and so much better prepared for wheat. The consideration which weighs most heavily against the change is, the precariousness of the wheat crop of late, owing to the great multiplication of disasters to which it is subject. Within a few years past we have been visited by a disease hitherto unknown to the farmer in this neighborhood, called the scab—(heads dead either wholly or in part.) Last year

our wheat crops were exceedingly promising until this most formidable disease appeared. In some instances the promise of thirty bushels to the acre scarcely realized more than five or six; in others a very heavy crop was scarcely worth the labor of harvesting it. Our barns and farm-yards were rarely so well filled, and our garnerers never so empty. Estimating my crop by the number of wagon loads in the straw, at the usual yield to the load, and I should have had considerably over 3000 bushels: it thrashed out between 12 and 1300. Some of my neighbors suffered still more. The injury in this neighborhood was almost universal, and almost invariably the most highly improved lands (particularly those on which stable manure had been used) suffered most. The crop is now very promising; but this appalling disease has already made its appearance. Our crops of rye and the most forward wheat suffered severely by the very severe frosts in May. The crop of clover is very far short of the usual product.

S. H. L.

GREENHOUSE PLANTS.

Greenhouse plants are such as are natives of the Canary Islands, New Holland, the Cape of Good Hope, and other countries in the same latitudes, which only require to be protected from the frosts of this country. They are therefore kept under glass during winter, but no fire is requisite, unless a strong frost is expected during the night. In winter they should have plenty of air during fine days, as early in the day as the weather will permit, and the house should be shut up early in the afternoon, if the weather be cold. When the weather continues damp and wet, a little fire is requisite to expel the damp, for greenhouse plants are more likely to be injured by damp than cold. The plants should be looked over every day, to take off any dead leaves, and to water them that are dry. This operation should take place only in the forenoon, and if the surface of the earth in the pots becomes green, it should be removed with a flat stick; but not so deep as to injure the roots, when a little fresh earth should be laid upon them. Towards spring they require a more plentiful supply of air and water, and if no frost be apprehended, some of the sashes should be left a little open all night, so that the air may be gradually admitted as the weather advances towards summer, until the time of setting the plants out of doors. In some seasons this may be requisite about the middle of May, in others not until the end. Calm cloudy weather is the best time for setting them out: the most sheltered situation should be chosen, a bed of ashes being previously prepared for them.

There are various opinions as to the best time of shifting greenhouse plants into fresh pots and mould; we think the earliest spring time should be preferred. Some shift them before they are set out of doors, others when they first set them out; some do this in the autumn, which of all times is the most improper; the pots should always be well drained with shreds. If any of the plants have grown too straggling or tall, they should be cut back early in the spring, that they may become good bushy plants before autumn. In summer while the plants are out of doors, they should be regularly supplied with water in dry weather, as

late as possible in the afternoon. The mould for potting should never be shifted, but chopped up finely with the spade with the turf. This keeps the soil light and loose, it allows the roots of the plants to spread, and the water to penetrate; while, on the other hand, sifted mould hardens and becomes sour. Cuttings of greenhouse plants require putting in at various seasons. If they are to be ripened cuttings, they should be planted early in the spring; but if young, the time to plant them is when the shoots have grown a sufficient length for that purpose. In potting of plants raised for cuttings, care is requisite not to injure the fibres. Put them in small pots first, and increase the size as they grow; but be careful not to put them in too large, or to give them too much water. Sow the seeds early in the spring, place in a little bottom heat, and pot the young plants separately when they have grown an inch high.—*Mr. George Don, on Gardening and Botany.*

IMPROVED RAW SUGAR.

A most decided improvement has taken place in the manufacture of sugar from the cane juice, and some samples introduced into the market have excited the most eager anxiety from all parties interested in this branch of colonial and commercial intercourse. It is pure raw sugar, obtained direct from the sugar cane, without having undergone any subsequent process of decolorization or refining, prepared by effecting the last stages of the concentration of the cane juice in vacuum, at a temperature insufficient to produce any chemical changes in its constituent parts. By this improved and scientific process of manufacture, no molasses or uncrystallizable sugar is formed, and there is hence an increase in the quantity of sugar obtained of 25 per cent. Whilst this establishes the philosophical fact, that molasses are not an *educt* of the cane, but were merely a product of the former operation, from the intense and long continued degree of heat employed in the processes, this saving from the vast quantity of deteriorated material must be considered an object of the very first importance to the planter, in the increased quantity of his production, which is likewise obtained in a very far superior degree of quality and purity; and readily commands a price of £10 to £12 per cwt. additional in the market.

The sugar, thus obtained, is in perfect, pure, transparent, granular crystals, developing the true crystalline form of the sugar, and being entirely free from the least portion of uncrystallizable sugar or coloring matter. It cannot fail to ensure a preference in the market for all purposes of manufacture, solution, or for domestic economy, as it is a purer sweet than even the best refined, and possesses a rich melifluous taste, not approached by that obtained by any other process, whilst it is not apt to become acescent in solution.

In addition to the great advantages to the planter, in saving from the vast quantity of deteriorated material, and that extensive state of partial decomposition, in which the raw sugar has uniformly been transmitted to our hands, the time and labor of the operation is greatly decreased, the apparatus possesses the power to make double the quantity in the same space of time as the old method; and this is ready for shipment in four days, in lieu of three weeks, as heretofore. In the

manufacture of rum, all danger of deterioration in the production of empyremua is avoided, and a far purer spirit is obtained by the use of the molasses, which are separated by this process.

The new process is now in complete and successful operation in eight estates in Demerara. From the results of the first trials, the introduction of the present improved process cannot fail soon to become general; while it is considered by the best practical judges, to open sure and certain means of re-vivifying the spoiled fortunes of the planters, and to be of the most material influence in promoting the future prosperity of our West Indian Colonies.—*Medical and Surgical Journal.*

GOLENOS OAK.

This large tree, which was felled in 1810, grew about four miles from the town of Newport, in Monmouthshire. The main trunk at 10 feet long, produced 450 feet; one limb 355, another 472, a third 235, a fourth 156, a fifth 106, a sixth 113, and six other limbs of inferior size, averaged 93 feet each, making the whole number 2426 cubic feet of sound and convertible timber. The bark was estimated at six tons; but as some of the heavy body-bark was stolen out of the barge at Newport, the exact weight is not known. Five men were twenty days stripping and cutting down this tree; and a pair of sawyers were five months converting it, without losing a day, Sundays excepted. The money paid for converting only, independently of the expense of carriage, was £82; and the whole produce of the tree, when brought to market, was within a trifle of £600. It was bought standing for £405. The main trunk was 9½ feet in diameter, and in sawing it through, a stone was discovered, six feet from the ground, above a yard in the body of the tree through which the saw cut; the stone was about six inches in diameter, and completely shut in, but round which there was not the least symptom of decay. The rings in its butt were carefully reckoned, and amounted to above 400 in number, a convincing proof that this tree was in an improving state for upwards of 400 years; and as the ends of some of its branches were decayed, and had dropped off, it is presumed it had stood a great number of years after it had attained maturity.—*Time's Telescope*, vol. 3.

D'ARCET'S APPARATUS FOR EXTRACTING GELATINE.

On March 9, at the Royal Institution M. D'Arcet's improved apparatus for extracting gelatine from bones was exhibited, and some of the soup made in the theatre. It is an improvement of Papin's digester. It is a pity that these machines are not more used in England, for we heard that 800,000 rations of soup are made in Paris weekly from bones; and we are informed, that if the bones of an ox were put into the digester, and the whole of the flesh into any other vessels, that the bones would yield one-third more gelatine for soup than the whole of the meat; i. e. the proportions of the former would be as three, the latter as two. The fibrine, of course, would be eatable and useful: it is of the soluble matter only that account is here taken. The refuse of the bones, after the gelatine is removed, forms excellent materials for making animal charcoal.—*Medical Gazette.*

ON THE EFFECTS OF GYPSUM NEAR SALT WATER.

To the Editor of the Farmers' Register.

It has frequently been asserted and generally believed, that plaster of Paris, or gypsum, would not answer as a fertilizer of soils situated on salt water, or within the influence of saline atmosphere. From an experiment made by me this spring, with plaster on clover, I am convinced of its *powerful* effect as a manure on soil under the influence of salt water.

On the 5th of March last, I had plaster strewed on alternate lands, ten feet wide, leaving the intermediate lands unplastered. When the gypsum was applied, the clover had sprung, some of it three or four inches high. The plaster was directed to be strewed at the rate of a bushel to the acre, but from the appearance of it on the land immediately after, I thought it was less, and not sufficient in quantity to do any good, even if the soil were congenial to it. I have been however, not only disappointed, but agreeably surprised, by the heavy growth of clover, where the plaster was applied; whereas in the lands not plastered it was indifferent.

From the deep verdant color and high growth of the clover on the lands which had been plastered, contrasted with the unplastered part, the ground had the appearance of having been mowed every other land. These effects were only visible where the soil was well taken in clover. In some portions of the ground, it had been exhausted, or eaten out by other grasses it having been in clover three years. On the other grasses which the soil had spontaneously thrown up, I saw no effect produced by the gypsum.

A neighbor who saw my clover, assures me he never saw so great effect produced by plaster in the county of Frederick, where he resided for some years, and where plaster acts as powerfully as in any part of Virginia.

The land which was the subject of this experiment, is distant about a mile from the Rappahannock, where the water is salt, and on the first range of hills above the river low grounds. It is a fertile clay, well adapted to wheat and corn, and capable of producing good crops of either. It has no appearance of being naturally calcareous, nor have calcareous manures been applied to it. I observed in some part of the land, where stable manure had many years ago, been abundantly applied, and where the clover was very luxuriant, that the difference between the plastered and unplastered lands, was slight; though in these spots there was a difference in the color of the clover. This reminded me of the theory of Sir H. Davy, that probably plaster may be supplied to some soils in sufficient quantities, in manures which contain it. I could upon no other principle account for its want of efficacy in these particular places, than by supposing the soil to have been sufficiently supplied with gypsum, chemically combined with stable manure.

May it not be very questionable as to the effect which saline atmosphere, has upon gypsum? *Has it any?* It is advantageously used in some parts

* Since the above was written I have accidentally turned to your "Essay on Calcareous Manures," where you say page 143—"It is well known that gypsum has failed entirely, as a manure, on nearly all the land on

of England very near the sea, as for instance in Kent; whereas it has been found of no service in some situations more remote from the coast. If salt air had the effect of neutralising plaster, would it act any where in Kent? We should say not, when we remember it has been said that the spray of the ocean has been carried in violent storms, fifty miles from the coast.

Though Davy was not a practical agriculturist, yet his opinions in all that belongs to chemistry, directly or indirectly, deserves weight. He says, "the reason why gypsum is not generally efficacious, is *probably* because most cultivated soils contain it in sufficient quantities." He found gypsum in the soils of Norfolk, Middlesex, and Essex. Lord Dundas informed him, that having tried gypsum without any effect on his estates in Yorkshire, he had the soils examined, when it was found in both of them.

It is not my present purpose to examine into the "cui," or "quo modo" of the efficacy of plaster, but to assert the fact of its effect upon my own land on the Rappahannock.

Should the attention of our landholders in this region of country be called to the use of plaster, and if it be found to act as I am persuaded it will, it may be added to the long list of manures within the reach of almost every farmer in this section of country, such as marl, sea grass, &c. which if judiciously and perseveringly used, would render agriculture, *with us*, one of the most certain and profitable pursuits of life.

R. W. C.

Richmond county, June 17, 1834.

RICHMOND MILLS.

During the last season 235,250 bushels of wheat where ground at Haxall's Columbian Mills in this city, producing of family and superfine flour and middlings 48,100 bbls. of which 38,000 bbls. superfine branded "Haxall" were sold for the South American markets. This is the largest receipt of wheat in any one season by any miller in this city. The year Haxall's old mill was burnt the receipt at the Gallego mills was 204,000 bushels.

The Columbian Mills have now 14 pair of burrs besides rubbers and 4 pair more are to be added. The new Gallego mills have 20 pair of burrs besides rubbers.—*Richmond Compiler.*

"which it has been tried in the tide-water district, and we may learn from various publications, that as little general success has been met with along the Atlantic coast as far north as Long Island. To account for this general failure of a manure, some one offered a reason which was received without examination, and which is still considered by many as sufficient, viz. that the influence of salt vapors destroyed the power of gypsum on and near the sea coast." Who this "some one" was, I should like to know; and whether he came to his conclusion by actual experiment or by bold conjecture.

[The opinion referred to by our correspondent, certainly was not founded on experiment, and probably had no better support than "bold conjecture." We believe that it will be found stated (and with approbation) by Mr. Livingston, in the appendix to the article *Agriculture*, in the American edition of the Edinburgh Encyclopedia: but as we have not that volume at hand, it is possible that we may be mistaken.]

EXTRACTS FROM "A FEW DAYS AT HOLKHAM."

By the Rev. HENRY BERRY.

[The following extracts are from a much longer article continued through the last three quarterly numbers of the British Farmers' Magazine. We do not like to begin the publication of any thing until its conclusion has been seen, and a judgement formed of the whole together; and this we are just enabled to do by the arrival of our last foreign periodicals. The report is much less interesting than we should have anticipated from such a subject, treated by so competent a writer as the Rev. Henry Berry, who is now conductor of the Farmer's Magazine. Still, it cannot fail to please most readers to hear the latest account, however imperfect, of the operations of the farmer who perhaps truly deserves the title of the greatest and best, and who is one of the most eminent living benefactors of the human race. His immense estate, now one of the most fertile and profitable in the world, was once but little better than a barren waste. All its fertility, beauty and value, have been created by the skill and labors of Mr. Coke. If there is any greater service which he could have rendered for his country, and for the world, or if there ought to be more glory attached to the name of any living man, we at least have no conception of either.]

From the British Farmers' Magazine.

* * * * * We proceeded without further delay to Holkham, where we arrived about mid-day. I had never heard, and of course had no conception of Mr. Coke's active habits. He rode up to the house immediately after our arrival, and at the same time ordered luncheon and the carriage, and in less than half an hour we were on our way to view, in the first place, his Devon cattle. It may be proper here to say something of the land on which these cattle are depastured, and though much has already appeared before the public on the same subject, from more able pens than mine, the interest attaching to every thing at Holkham, and more particularly the necessity I am under of noticing the quality of the land, will excuse what may appear, to some persons, an unnecessary repetition. Mr. Coke's estate, around Holkham, consists principally of a hungry sandy loam, or light gravel of the same character, with occasional, but not frequent, interruptions of small patches of bog. The latter description of soil was, during the early part of Mr. Coke's proprietorship, covered with low alder bushes and sedges, which seldom failed to hold a fox. They are now, by his skilful application of capital, rendered highly productive water-meadow. The instances of this kind are however few, and not of any great extent where they do occur. But in every possible case, advantage has been taken of circumstances, and the profitless bog has been converted into water-meadow of the highest quality. With respect to the arable land, and the permanent pasture, which principally owes its existence to the system of inoculation,* the nature of the soil, and the extent

* Inoculation of grass land is setting out bits of old turf of the grasses desired, at such distance as will permit the plants to spread and cover the whole surface.—
ED. FARM. REG.

of its amelioration, may best be judged of from the following facts. An estate let, when Mr. Coke first came to Holkham, at one shilling and sixpence per acre, and subsequently on a lease at three shillings, was, at the end of his term, quitted by the tenant in consequence of his considering he could not pay a rent of five shillings per acre. The estate was tithe-free!—Now, mark the difference in the performances of two men, and let all dependency cease as to the capabilities of our poor soils to produce food, and profitably to produce it, under an equitable and judicious protection. From this identical estate, Mr. Coke, under his superior management, obtained seventy-nine bushels of barley, per acre! Again, on the same land, and on land of similar quality, his crop of wheat of 1832, from 306 acres, produced 2632 coombs; being an average of rather more than thirty-four bushels per acre. This was obtained from land decidedly not wheat land; but it shows what cultivation will achieve. I shall not at present go into any detail of Mr. Coke's management of his wheat crop, the remarks which have preceded, being preliminary to a notice of his Devon cattle, it being evident that on such land; howsoever well the permanent pastures may have been managed, not only drought, as in the present season, but also many other causes must conspire to render the bite for cattle too frequently scanty; and, consequently, to render much circumspection necessary in the adoption of a breed. It is now about forty-two years since Mr. Coke, very properly considering the difficulties he had to encounter on his light poor soil, began to breed Devon cattle, and it is not a little creditable to his judgement that he has, during that period, scarcely referred to any thing which may, properly speaking, be called a cross; certainly, to none of which he could permanently avail himself, and yet his Devons, take them altogether, are by far the best I have ever seen. I much doubt whether the county of Devon can produce such an animal as one of Mr. Coke's bulls, the sire of the ox which embellishes this number of the Magazine. I am totally free from prejudice on these matters, and, therefore, candidly admit the ox in question to have been, in my judgement, at the time I saw him, the most complete I ever put my hand on. I am sorry to say Mr. Coke's indulgence of his neighbors' wishes consigns this ox to slaughter at home. Such an animal ought to appear at Smithfield. He has, however, others coming forward, of high promise, and I trust he will gratify the Smithfield club, on the first possible occasion, with a specimen. The dairy of Devon cows appears to be, and I am assured is, highly productive, each cow, no matter what her other excellencies, being rejected which proves a bad milker. They present great uniformity of character, with all the genuine distinctions of the pure north Devon cattle, and, with great aptitude to fatten, possess precisely the compact bodies and short legs, which constitute the *multum in parvo* I have so often advocated. Much as I admire the Norfolk husbandry—much as I have seen to admire in the zeal of Mr. Coke's tenantry to evince their gratitude and respect, there are two things which I must severally censure and deplore. While the judicious and spirited improvements in tillage of this great landed proprietor have been forcing conviction, and obtaining adoption, his efforts as to the stock of the country have been comparatively vain, and he stands alone, a solitary in-

stance of a man who for forty-two years has produced proof, and invited investigation into the merits of his Devons,—has offered and committed costly sacrifices to carry his useful object, without, except in few instances, being able to induce his tenantry to adopt a profitable breed of cattle, for an unprofitable one—a system of economy devoted to the most useful end, in lieu of a system of extravagance, purchasing its advantages at a rate beyond all chance of remuneration. With, as I said before, few exceptions, the miserable and unthrifty home-breds are the cattle kept, but, generally speaking, little or no regular stock of cattle is maintained, and during the present year, in the month of September, short-horns (so called) and every wretched specimen conceivable of all that is bad, were consuming oil-cake in the yards, for the purpose of converting the straw to manure. On this subject Mr. Coke feels, and well he may, much disappointment, but it is not confined,—this blindness to their true interests—to the article of cattle alone. In sheep it is the same, and prepared as I am to show, hereafter, that no breed in the island now equals, in profit, that of Holkham, I shall only here observe, that so far behind the rest of the world are the majority of Norfolk men, on the subject of stock, that they appear to select with a view to obtaining those qualities which well informed men would pronounce bad, and invariably reject. Be it remembered, I have qualified this censure with a reservation,—and it will be my agreeable business hereafter to register some honorable exceptions. While our ideas were yet employed in reflections on the beautiful oxen we had just inspected, Mr. Coke rather mischievously contrived we should arrive at a tenant's farm, where a considerable number of short-horned steers were acting the part of very unthrifty machinery for the reduction of oil-cake, in combination with straw, to manure. The laugh, of course, was against me, and was not diminished by Mr. Hillyard's silently, but expressively, appealing to a brick wall, as the fittest representative of the quality of the flesh of these animals. I was reminded, on this occasion, of the appeal of the "Lancashire Farmer" to Mr. Coke's authority, as condemnatory of short-horns, but he instantly explained to me, as I well knew beforehand he had meant, that it was such as the short-horns then before us, Lincolns, or, indeed, any thing (for they were a mixture of all) that he condemned, and that he had not improved short-horns in view at all. I was authorized to make this statement, and consider it ought not to be omitted. It was early an object with Mr. Coke, to induce his tenantry to adopt the Devons, but he succeeded in a few instances only. In one of these he requested his tenant's wife to accept four Devon heifers, as a present, and to give them a fair trial against the home-breds. The cattle were accepted, and the trial made, and it can scarcely be necessary to add the produce for the dairy was of very superior quality, while the advantage in respect to carcass, was still more conspicuously evident. This tenant then became a breeder of Devons, and I saw on his farm some beautiful and most useful cows, but I am sorry to add an account of his inexplicable conduct as to this stock. He was disposing of his Devons, without any apparent motive, and substituting for his oxen of that breed, some shapeless unthrifty beasts, of immense bone, and, apparent-

ly, the produce of a cross between a bad Scot, and a worse Norfolk home-bred. But Mr. Coke has not confined his efforts to the dissemination of his Devons among his superior tenantry. The smallest holders, as well as the cottagers, have an opportunity kindly afforded them, provided they possess also the will, to obtain a superior sort of animal to that of the county. A number of in-calf heifers are annually draughted, and allowed to the purchasers at £12, £3 being returned by Mr. Coke, if the purchaser choose, for the calf, whatsoever its sex, and should one of these heifers, or all of them, prove bad milkers, they are replaced by others. Thus instead of being imposed on by a jobber at a fair, each small holder has a good dairy cow *certain*, and in proportion as they are disseminated, the country benefits in its breed of cattle. It is not foreign to the subject of these small holders, to observe, respecting them that they are generally Mr. Coke's laborers, who have been put forward by a judicious promotion, which follows a career of sober industry. I witnessed the announcement of his advance to what would be a provision for his declining years, to one of the workmen, who was engaged superintending some ploughs at work. Need I add the announcement was well received, but evidently excited no surprise, and appeared to be considered as the result of a compact, well and tacitly understood between the employer and the employed, the benefactor and the meritorious. I do not consider that Mr. Coke could with propriety keep any other cattle, as a breeding and dairy stock, at Holkham. The stock next in fitness would be the Scots, but the Devons mature earlier, and, I think, judging from his specimens, they will pay a good deal more money. Of his own north Devon oxen he works none, but he has at plough twenty pair of south Devons, somewhat larger, coarser, and showing less purity of blood. They are, however, admirable workers, very active and docile, and in conjunction with the advantages of saving horse labor, while also they continue growing, possess a disposition to fatten quite sufficient to indemnify those who employ and feed them, in an ample manner. I am well convinced, from seeing the stock at Holkham, from hearing Mr. Coke's sentiments, and from every circumstance I meet with, at all bearing on the subject, that with the Devons, as well as the larger breeds, it is folly to attempt to increase size—that there is only one best model for all—and that is, the frame combining great substance, well compacted together, with deep ribs, and short legs. It remains to observe, with respect to the Holkham Devons, that their pastures had, in common with all in the county, suffered much from the drought, but notwithstanding this, and that they had only a sheep-bite when I saw them, the cows were, most of them, fat and healthy, and exhibited, in a striking degree, their fitness to fight their way under the difficulties attending a light thin soil, and short bite of grass.

Among the tenants, whose stock I inspected, it would be wrong to omit mention of Mr. Blomfield, who has a superior herd of Devons, and to whom the country is indebted for the hints which led to the transplantation of turf, for the purpose of laying down land to permanent pasture, at Holkham. This gentleman's cows were particularly good in the fore-quarters, and appeared to give a great deal of milk. They have been bred a good while very

closely, and one or two defects were, in consequence, becoming prominent and general. Mr. Blomfield appeared to be fully sensible of this, and to admit the necessity of a cross. He informed me his cows would average an ounce of butter to a pint of milk, and that experience had convinced him, he could graze, and keep in high condition, four Devon cows, on the same quantity of land as would support three home-breds, or Norfolk cattle, in indifferent condition. Strange, that, with facts such as this before them, and stated on the authority of so respectable a man, and able a farmer as Mr. Blomfield, the Norfolk tenantry should not at once, and for ever, banish the home-breds.

With regard to stock, the grand feature, and one that every day assumes, and will continue to assume, additional importance, is the improvement of the Southdown flock at Holkham. When Mr. Coke first came to the estate, the long-legged, misshapen, unsightly, and unthrifty Norfolk breed, had possession of the country, keeping alive an active struggle with the rabbits, for the scanty herbage, a struggle which their length of limb and great speed well fitted them to maintain.

* * * * * Very shortly after this, the Southdowns were seen in possession of the inclosures at Holkham, and long continued to bask in the rays of public approbation, and to evince properties well deserving it. But they did not, under succeeding circumstances, satisfy the enterprising mind of their breeder. One of those fluctuations which are perpetually occurring in manufactures, as in every thing else, demanded a different description of wool, and the question was how to obtain it? Other circumstances also forced themselves on attention. The Southdowns, like the Leicesters, and all improved breeds of sheep and cattle, under similar circumstances, began to run to fat, and to want, in both fat and lean condition, *lean meat*. The *legs of mutton* were becoming abridged of their fair proportions; delicacy of constitution threatened a dangerous inroad; lambs fell weakly, and often perished; and the ewes were becoming worse nurses to those that survived. How long Mr. Coke may have pondered the matter before he ventured on the experiment, I am unable to say, but he resorted to the Hampshire sheep for a cross, with the most brilliant results. This experiment I consider the boldest ever entered on by a breeder, and, I think, any one will agree with me who sees the Hampshire sheep. Let the character of the experiment, however, be what it may, its success is not equivocal. Mr. Coke has lost nothing of early maturity, and has gained in the constitution of his flock. His lambs are dropped stronger, stand the cold better, and are better nursed. He has wonderfully increased the lean meat, and, in particular, enlarged the leg of mutton; while, to crown all, I was assured by Mr. Waller, whose authority will not be questioned, that the Holkham wool is, at the present moment, the most valuable in the island. His shearlings of this improved flock, sold last year at sixteen to eighteen months old, averaged, wool and carcass, £2. 10s. each!

I have frequently had occasion to remark, that few errors prevail to a greater extent, and with more injurious effect, as regards the progress of the science of breeding, than that of adopting one and the same standard, whereby to judge of animals of different breeds, at various periods of their

age and growth. I admit, and indeed, have always contended, that there exists one model, which may be safely adopted for all, but this model may be perfected by a number of varying particulars, in different individual breeds. Perhaps I may be better understood by stating the opinion that certain constituent parts may produce a *whole* in one animal, similar to the result derived from very different constituents in another, and as it is to the whole—to the result—we are finally to look, regarding constituents only as indicative of it, I cannot but consider the common practice of judging one breed according to its correspondence with another breed, as a common error. A breeder of Leicester sheep, for instance, will condemn the Southdowns because they are not like Leicesters; whereas he ought either to judge Southdowns by comparison with Southdowns, or, if he will institute a foreign comparison, it should be at the last moment only, when both are made up for the butcher: he will then find they have attained the same object—utility—by different means, and though, compared together at earlier periods, they would have evinced striking differences of formation, yet the process of feeding has developed two carcasses very much alike, and each exhibiting a profitable whole. Thus, also, a breeder of Hereford cattle passes, generally speaking, a sweeping condemnation of improved short-horns, because they are not like Herefords;—he forgets, or, perhaps, has never reflected, that for short-horns to resemble Herefords, or Herefords short-horns, during the period of their growth, or at any time but when made up for slaughter, would be to indicate degeneracy. They arrive at the same finished and profitable state, after a periodical exhibition of different characteristics. To render this still more obvious, I will repeat the objections I have heard made to good short-horns, by men whose general information would lead to the expectation that, even on this occasion, they would penetrate beyond the surface in pursuit of truth, with eyes undimmed by the mists of prejudice. I will suppose myself exhibiting half a dozen yearlings to such a person; I should be favored, as I have been a hundred times, with remarks similar to the following: "They are very good of the sort; but the bone is too large—the frame not neat enough—the quality of the flesh too loose, and the hide too thin." Such objections are urged by men who annually visit Smithfield, and see the same sort of animals thus censured beating the Herefords at that time when only comparison ought to be instituted. But what are the sentiments of an unbiassed looker on, placed in similar circumstances? He remarks, at once, "an animal so much larger in frame as the short-horn, must necessarily have more bone, and, probably, less neatness; indeed, if reduced to the Hereford degree of neatness, constitutional degeneracy, and utter worthlessness, would be unavoidably implied. Again, with respect to a less firm quality of flesh in an unfed state, every one acquainted with the subject knows that the early maturity, so conspicuous in the improved short-horns, would be incompatible with any other quality of flesh and hide, for there can be no doubt the later maturity of the Herefords is owing to the unyielding nature of their hide and flesh. A beast, therefore, which is to come into the market, matured a year earlier than his opponent, may well be allowed those qualities on which his quicker growth and

maturity depend, and as he is known when fed to want none of the requisite firmness of flesh, it is at that period only when the two breeds ought to be compared."

I have been led into the foregoing remarks and statement, by a consideration of the steps pursued by Mr. Coke in the progress of the improvement effected in his sheep, and by the reflections which presented themselves during an endeavor to ascertain the principles which actuated him, for though he would readily have gone most fully into any particulars I might have requested, on this, as well as on any other occurrence of interest, it has always appeared to me a not unprofitable exercise of the mind, to attempt an investigation of the views of those whose endeavors have been crowned with success.

It is very evident, on the inspection of the Holkham flock, that Mr. Coke knew how to draw admirable results from, what would appear to many, very unpromising particulars, and that the want of resemblance in the Hampshire sheep to the more correct models presented by the Leicesters and Southdowns, by no means dismayed him. He did not act upon the principle I have been censuring, and abstain from the cross with Hampshire sheep, because they were unlike his Southdowns, or because they were not in themselves what he considered sheep ought to be, but he adopted them for a cross under the assurance that they could furnish what he wanted, and relied on his own skill to obviate the inconveniences which might arise from that proceeding. In this ability to foresee, in what the majority of observers would consider unpromising combinations, a great future excellence, and, on the other hand, to detect those cases in which particular combinations will be productive of disastrous results, consists the superiority of a breeder over his competitors. Persons of less skill may, indeed, for a time go on successfully, with a good stock, but, without this tact, they will fail to originate any essential improvement, otherwise than by chance. Nothing can, in the first instance, be imagined more unpromising than the Hampshire sheep, and, indeed, the produce of the first cross with the Southdown is any thing but attractive to the eye. But under the investigation of the hand, qualities become apparent which the eye failed to discover, and it is evident, materials are presented wherewith a skilful breeder, returning again to the pure Southdown, may produce those results, to obtain which the cross was instituted. Under these circumstances, and personally directing every selection, Mr. Coke has produced a flock, differing from pure Southdowns only in these particulars, viz.—in the possession of more useful frame (a description comprehending much that is highly important)—a superior quality and quantity of wool—and a greater quantity of mutton, particularly distinguished for a sufficiency of lean meat, per acre, and he has not, in the least, sacrificed the early maturity of the Southdowns. Many persons may doubt the last mentioned fact, on plausible theoretical grounds, but in this case the great access of constitutional stamina resulting from the cross has more than atoned for any loss of the maturing quality, which might, under other circumstances, have been experienced. Practical men will immediately recognize the particulars in which the last mentioned advantages would be realized.

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It is impossible for me, myself a breeder, and an advocate for crossing, under circumstances I have frequently stated, to dismiss this part of my subject without expressing a conviction, that independently of all the advantages which result to the public from the adoption and perfection of this judicious cross, we are no less indebted to Mr. Coke for the example* he has set us, of successfully breaking through one of the trammels by which breeders suffer their exertions to be paralyzed, and, too frequently, their stocks ruined. All things equal, except purity of blood, I should assuredly give the preference to a pure stock, but if such a stock be evidently rapidly tending towards that state, in which nothing will remain but its purity to recommend it, why should we suffer ourselves to be fettered by idle, and not merely useless, but mischievous distinctions, acting as if the word *pure* (to which, by the bye, but few stocks can lay claim,) possessed a talismanic power, not only to shield them from deterioration, but to promote their improvement? To some persons all this may sound strangely, coming from a breeder of pure improved short-horns, but a fair interpretation of my humble labors in the field of agriculture, will acquit me of ever aiming to promote any thing which appeared otherwise than useful, according to the best of my judgement.

As in the case of the Devon cattle, Mr. Coke's improvement on his flock of sheep is insufficiently valued among his tenantry, but from what I saw and heard, I doubt not his rams will soon be generally resorted to. Among the Holkham tenantry to whom I was kindly introduced at their own houses, was Mr. Kendle, on whose farm Kippen Ash Fair is held. This gentleman informed me he was using the improved rams, and confidently relied on realising the advantages I have enumerated. He particularly considered he should gain in weight of mutton, per acre, as up to that period he had stocked his sheep as closely as formerly. But the most important fact, resulting from his adopting the improved rams, Mr. Kendle considered to be, that the lambs being dropped rougher and harder than those of the pure Southdown, he considered himself a gainer, in consequence, to the amount of fifteen or twenty in a hundred! Add to the foregoing, that he was making a considerable addition to his flock of ewes, in consequence of finding he can now turn off his sheep as yearlings. These facts were well authenticated and known, and yet at the fair before mentioned, where upwards of 20,000 sheep were penned, the long-legged Norfolk sheep only were in demand, and I was assured that, as sheep, nothing much worse could be imagined—a fact easily credited from the specimens which came under my notice in different parts of the county. On this subject a singular fact came out in conversation with Mr. Kendle. He informed me the jobbers would not give so much, by seven shillings each, for his superior sheep as for the wretched Norfolks. To these middle men I ascribe, in great measure, the infat-

* With respect to sheep in particular, this example is of the utmost importance, for it is probable that convenience or fashion will frequently call on the breeder to vary the staple of his wool, and immense losses have been sustained while breeders have hesitated whether they should follow fashion, or wait for its re-adoption of the article they produce.

uation which prevails on this subject. They can more readily provide for the demand of the article they deal in from the widely-spread Norfolk sheep, than from the pure or improved Downs, in comparatively few hands. It is therefore manifestly their interest to encourage prejudice, and keep down the price of the two latter, and especially not to afford customers any opportunity of comparing them, as to their progress in feeding, with the much slower Norfolk. Any intelligence on this subject would create a demand they would find very embarrassing. Thus a majority of the Norfolk farmers, practising the best system of tillage in England, allow themselves to be gulled and cheated out of a very considerable proportion of the profit derivable from their superior turnip management. But it is some consolation to believe, that time, which dissipates other infatuations, will, in the end, prove fatal to this also. I offer no apology for the freedom of these remarks: I will never withhold the humble meed of approbation from any practice which appears worthy of it, neither shall I omit to censure a proceeding injurious to the country, and, to the parties adopting it, most particularly hurtful.

I shall close my somewhat lengthy remarks on the Holkham sheep by a brief statement which bears on the question, as to the comparative value of their fleeces. A lot of pure Southdowns, purchased to be fattened for the use of the house, cut one pound and a quarter, each less wool, and of inferior quality, than sheep of the same age of the improved stock.

* * * * * I have already had occasion to allude to the difficulty of observing a connected and regular line of narrative, where circumstances tempt so strongly to digression, and must, once for all again, solicit the reader's forbearance on this account, while I carry him back with me to Mr. Garwood's farm. I understood that this was one of the worst of Mr. Coke's estates, and assuredly nothing can present a more decided proof of the wonders to be performed under most discouraging circumstances, by the skill and enterprise which have been at work in every direction around Holkham. On this estate, of one thousand acres, there existed, some years ago, a bog of fifty acres, from which peat fuel was dug, and the nature of which may be understood from the fact, that an unfortunate man, attempting to cross, was suffocated in it. What was bog, profitless, except for fuel, is now a fine water meadow, which, the occupier informed me, he valued *along with the farm*, at three pounds per acre. In the late dry summer, being enabled to water it, he informed me the produce was almost incredible—at all events he kept on the fifty acres the following stock, viz. more than ten sheep per acre, twenty bullocks, from four to six years old, and ten horses.* Early in his occupation of this farm, Mr. Garwood had a predilection for the Norfolk home-bred cattle, of which he selected and bred some of the best. Being, however, superior to prejudice, he was induced to go into Devonshire, and purchase the cattle of that county. Having tried both, he came to the conclusion, that, in point

*Is it not singular, that, within about ten miles of Holkham, and within the reach of almost every day experience of the value of meadow thus circumstanced, I should see a considerable tract of land inviting irrigation, a brook running along side and above it, but tempting the sluggard in vain?

of profit, the home-breds are far inferior, and, as might be expected, much greater consumers of food. An examination of his books gave an average of four pounds of butter, per week, for each Devon cow.

Among the numerous visits paid to the tenantry of Holkham, highly as all gratified me, certainly, that which introduced me to Mr. Pettingal, and his farm, proved the most agreeable; a fact to be ascribed to the circumstance that Mr. Pettingal, having only very recently entered on his occupation of an estate in want of improvement, I had the opportunity afforded me of observing how much may be done, and how rapidly, under the influence of a good understanding and perfect confidence existing between a landlord and his tenantry. It may be proper to mention in this place, that Mr. Coke values his own estates, and the best commentary on the manner in which he acquires himself is furnished by the fact, that no dispute has ever arisen, during any of these transactions, to drive a tenant from an estate, who felt any desire to remain on it. If a difference of opinion has occurred on the question of value, it has been overcome, on the one hand, by considerate and liberal concession, on the other, by implicit confidence. I would not be understood by the foregoing remarks, or by what may follow, to recommend gentlemen, generally, to take this nice and difficult affair into their own hands; such a recommendation would be absurd on every account, and little likely to obtain attention, for nothing but confusion and mischief would follow an assumption of that for which the parties are generally totally disqualified. My sole object is to show what an early devotion of time and ability, to a subject of infinite importance to country gentlemen, may achieve under favorable circumstances, when I assert that the cost of agency on this princely and highly managed property is considerably less than that on any other in the kingdom of, perhaps, half its extent and value. But such is Mr. Coke's systematic arrangement that every difficulty vanishes before it.

When Mr. Pettingal applied for his farm, Mr. Coke's idea of its value was stated to him, and it was fairly submitted, that a great outlay would be requisite to insure a profitable taking. He closed with the offer at once, expressing himself much pleased to have the farm, one of seven hundred and eighty acres, and concluded with these remarkable words, "Sir, I cannot put my money into so good a bank as your land." I believe he had, at the time when I saw him, occupied the estate about two years, during which period neither landlord nor tenant had been idle. A beautiful house, replete with every convenience, had risen, and Mr. Pettingal, on taking us through it, pointed out with marks of genuine satisfaction, the arrangements which had been made to provide for every comfort of his family. On the other hand, Mr. Coke's pleasure and approval of what his tenant had done, with a feeling corresponding to that of his landlord, were as ardently and unequivocally expressed. This enterprising tenant had, at the time I mention, completed very little short of one hundred miles of drains, with tiles drawn from a great distance, from the Holkham kilns. It is but justice to both parties to add, that the tenant up to this period had never asked for his lease, "but," remarked Mr. Coke, "I have made him safe, lest any accident should befall me."

The extensive and substantial outbuildings which were erecting on this farm, naturally introduced the subject of the Holkham plantations, for the massive and beautiful beams used in the progress of the work were the produce of silver fir trees planted eight years after Mr. Coke came to Holkham, an event which took place in 1776. Thus we find trees of forty-nine years' growth producing beams of substance and strength ample enough for the largest agricultural buildings. But it was not in a solitary instance, that of the silver fir only, that the propriety of devoting the attention of early life to planting was manifested; the floorings also were composed of beautiful oak timber, likewise the production of plantations of Mr. Coke's own making. There is something really rare and wonderful in thus beholding a man gazing as it were upon a creation of his own, and if any circumstance in this world is calculated to make us bitterly acknowledge and lament the mispent days and neglected opportunities, never to be recalled, it is something similar to what I witnessed on this occasion.

Mr. Coke was kind enough to take me, after service on Sunday evening, upon the tower of Holkham Church, the elevation of which is admirably calculated to display to advantage the tastefully disposed and thriving plantations of the park and surrounding farms. We had driven a good deal through the plantations and marked their healthful state, and the bird's eye view of the whole, obtained from the church tower, was the best imaginable finish. The soil about Holkham presents little attractive to the planter, but in this respect as in every thing else, difficulties and discouragements have been disregarded and overcome. The plantations are admirably managed, particularly with respect to pruning, an account of which, as applied to forest trees, has already appeared in this work. There is, however, one part of the practice here which I presume is little known, because seldom carried into effect elsewhere, and yet it is of the first importance to the owners of the extensive tracts of coppewood, which prevail in some parts of the island. The general practice in felling coppice is to cut downwards, by which means the stump is rather shattered than cut, and, consequently, the rain is admitted,—rottenness follows,—and the period of the ensuing fall is considerably protracted. The Holkham method is to cut upwards. The division is thus effected perfectly clean, without shattering, and it may be fairly calculated that the coppice is ready to fall again two years sooner than under the influence of the ordinary mode of operation.

The average annual value of the thinnings of Mr. Coke's plantations is three hundred pounds! These thinnings leave no apparent gaps, and are rendered requisite by the rapid growth of the trees intended to constitute useful and ornamental timber. The silver fir is, deservedly, a great favorite in these plantations, and among a number of beautiful specimens of the kind, which attracted my attention, I took the girth of one in particular, which proved to be six feet ten inches. The value of the tree at the then price of timber was nine pounds! A pretty ample return made to a planter, during his lifetime, for the exertion of inserting a diminutive sapling in a sandy waste!

But it is not in his regular plantations alone, that Mr. Coke has manifested the capabilities of his

country. He has seized and rendered available to his one great object, circumstances such as certainly never occurred, as matters of promise, to other men. I rode with him through a beautiful wood, the extent of which was one hundred and five acres, closely planted with oak trees of spontaneous growth. Originally, these trees could boast only a few old stunted oak pollards, and the rental of the ground was five pounds. Fifty years ago Mr. Coke inclosed it, leaving the pollards to do the rest, and from their annual deposit of acorns has risen the present wood, which pays him a rental of six hundred pounds!

About five miles from the house, and at the entrance from London, a very thriving plantation is now rapidly proceeding to ornament, on each side, two miles of the road. The trees have been planted on a very barren unpromising shingle, and the attempt, perfectly successful, was the suggestion of Mr. Blakie, who acted for some years as Mr. Coke's agent. Mr. Coke, with a kindness of feeling highly honorable to him, and at the same time complimentary to his agent, has named this "The Blakie Entrance."

I ought not to omit stating, that the fall of fir timber always takes place, at Holkham, during summer, when the wood is in that state, as to its turpentine, which tends most to its preservation.

In connexion with the plantations, it is impossible to overlook their numerous tenantry, the game. Were I to attempt to describe the numbers in which hares, pheasants, and partridges swarmed in every direction, and wherever we turned our heads, I should be suspected of exaggeration. But I wondered not so much at their numbers, as at the circumstance of any thing like a crop of grain escaping them; yet, such is the case, as the high averages of the different crops show. I believe this to be attributable to the cause assigned, viz. the thickness of the sowing and of the crops. So thick are they, that the game cannot with comfort get into them; and I have invariably observed, that, while any moisture remains on the growing corn, birds, unless driven, are averse to enter it. They have also a great dislike to any cover from which they cannot at once rise without entanglement. I know not how others may be reconciled to the reasons here assigned, but the fact that the game is abundant almost beyond belief, and yet does little mischief, is notorious.

* * * * * In the park I met with a, to me new description of game, in the numerous flocks of wild turkeys which frequently presented themselves. They were splendid birds, and, I am informed, a great delicacy, under proper management, on the table. Their flights during the shooting season, when they become alarmed, are of great length. It is singular that they do not meddle with the corn.

The system of cultivation at Holkham may be described as that which has since been adopted, more or less, by the best agriculturists, on soil of similar quality. The difference consists in the superiority of its application here. If, however, there is one part of Mr. Coke's practice which is more strikingly superior than another, it is his management of a naturally bad soil for wheat. This crop is grown on a clover ley, manured with rape dust drilled into the soil. The wheat is afterwards drilled at intervals of nine inches across the rows of rape, as it is considered that immediate contact with that

manure is undesirable. One drill completes eight acres per day, and the quantity of seed, per acre, varies from three and a half to four and a half bushels, according to the state of the land, and the season. Mr. Coke's tenant, Mr. Blomfield, has even sown so much as five bushels per acre, with the best results, and an experiment was stated to me, in which much more than the rental of any land was obtained by thicker sowing. A material, indeed on this light sandy soil, an essential, part of the management, is the rolling, which is effectually performed by heavy iron rollers. To those persons, occupiers of sandy soil, who consider the cultivation of wheat may not be successfully attempted on their farms, the following statement respecting the wheat crop of 1832 may be instructive and useful. Mr. Coke kindly permitted me to extract it from the farming accounts:—

306 acres produced 2632 coombs of wheat.—Average per acre a fraction over 34 bushels, disposed of as follows, viz.:—

Sold - - - - -	£2273	3	0
Seed - - - - -	329	2	0
Poor at Christmas - - - - -	7	0	0
Inferior tail to pigs, poultry, &c. - - - - -	21	3	0
	£2632	8	0

It is not to Holkham alone that Mr. Coke has confined his attention, or limited his creative power. The reference which he permitted me to make to his books and statements of accounts, presented many similar instances of successful enterprise in other places. From among these I was particularly tempted to select that afforded by Elmham Park. In the year 1817 he commenced improving this property, by means of draining, clearing ditches, and top-dressing with the soil taken from them. In these labors a sum of £510. 15s. was expended, by means of which the annual value of the estate had increased from 1817 to 1827 to the amount of £500, and a progressive increase of value has, since the last-named year, regularly continued.

ON THE CURING OF CLOVER.

The common method of curing clover is bad. The object to be attained is, to cure it in the *cheapest* and *best* manner. The common practice of spreading clover from the swath, causes the leaves and blossoms to dry and crumble, ere the haulm or stalks are sufficiently cured. Thus either the finer parts of the hay are lost, or the crop is housed with so much moisture, as to cause it to heat, and often to spoil. Clover should only be spread when it has become wet in the swath and should be gathered again before the leaves dry and crumble. Both these evils may be avoided, and labor saved withal, by curing the grass wholly in the swath and cock. After experiencing the serious disadvantages of the old method, I adopted the one I am about to recommend, and have pursued it satisfactorily ten or a dozen years. My practice has been to leave the clover to wilt in the swath, and when partially dried, either to turn the swaths, or to make grass cocks the same day, so as to secure the dried portions from the dew. That which is not put into cocks the first day, is thus secured the second day, or as soon as it becomes partially dried. These grass cocks are permitted to stand one, two, or three days,

according as the weather is, and as the curing process has progressed, when they are opened at nine or ten o'clock on a fair day, the hay turned over between eleven and three, and soon after turning, gathered again for the cart. Thus cured, the hay is perfectly bright and sweet, and hardly a blossom or a leaf wasted. Some care is required in making the cocks. The grass is collected with forks and placed on dry ground, between the swaths, in as small a compass as convenient at the base, say two or three feet in diameter, and rising in a cone to the height of four or five feet.

The advantages of this mode of curing clover are:

1. The labor of spreading from the swath is saved.
2. The labor of the hand rake is abridged, or may be wholly dispensed with, if the horse rake is used to glean the field when the hay is taken off, the forks sufficing to collect it tolerably clean in the cocking process.
3. It prevents in a great measure, injury from dew and rain—for these cocks if rightly constructed, (not by rolling) will sustain a rain of some days—that is, they have done this with me—without heating, or becoming more than superficially wet.

4. Clover hay made in this way may almost invariably be housed in good condition; and if rain falls after the grass is mown, the quality of the hay is infinitely superior to what it would be under the old process of curing.

The *raison* is this: the outside of the clover parts with much of its moisture while in the swath, and what is called sweating in cock is merely the passage of moisture remaining in the succulent stalks, to their exterior, and to their leaves and blossoms—it is a diffusion—an equalization of the remaining moisture in the cock. When this has taken place, evaporation is greatly facilitated, and the whole mass acquires a uniform dryness on opening the cocks to the influence of the sun, and winds, if too long an exposure is guarded against. Evaporation progresses in the cocks, after the hay is gathered for the cart, and during the operation of loading and unloading.—*Cultivator.*

EXPERIMENTS PROPOSED.

From the British Farmers' Magazine, [May 1834.]

The following hints upon experiments in agriculture have been just received by the committee [of the Saffron Walden Agricultural Society] and printed, in the hope that as it is quite unnecessary, in order to arrive at a practically useful result, that any experiment should be tried upon a large scale, some of the members of the society may turn their attention to the subjects.

The celebrated De. Candolle, in his *Vegetable Physiology*, has pointed out several ways in which persons who are engaged in various scientific or economic pursuits, may assist in perfecting the general theory of vegetation. To each class he proposes a separate series of experiments to be undertaken by them; and, among other notices, he lays down a few rules by which an *agricultural* experimenter should direct his researches. We would more particularly refer to the following:—

1. That a set of *comparative* experiments should be instituted, in all cases where any positive result may be desired. For instance, if we wish to

know the effect which any particular treatment of the soil will produce upon a certain crop, then we should at the same time ascertain what is the effect of the soil under ordinary circumstances upon a crop of the same kind. We should not be satisfied with the results of a single experiment, but should repeat it on different soils and in different situations.

2. No remarks that are made during the progress of an experiment should be trusted to the memory, but should always be carefully and scrupulously recorded in writing.

3. The experimenter should be careful to state his facts in such scientific or technical terms as may generally be understood, or, if he uses merely local and popular language, he should so explain himself, as to be clearly intelligible.

Had attention been paid to these rules, the results of many important experiments would have been available to science which are now no better than lost labor.

De Candolle has particularly alluded to the following experiments, among others, which may be proposed to agriculturists, as likely to afford interesting results:—

1. To ascertain whether blue vitriol (sulphate of copper) is serviceable in preventing the rust, smut, and some other diseases in corn, which depend upon the attacks of minute fungi.

2. To ascertain the precise effects of gypsum or plaster of Paris (sulphate of lime) in agriculture.

(a) Whether it be equally efficacious, calcined or unburnt, in promoting the growth of green forage, as tares, peas, &c. (*Leguminosæ*.)

(b) Whether it be useful as a manure for any other tribes of plants.

(c) Whether its use hardens the seeds of the *Leguminosæ* so as to render them difficult to be cooked.

3. To determine, by exact and varied experiments, whether different kinds of corn intermixed in the same field will yield a greater or less produce than when grown in separate fields.

4. To prove by experiments on physiological and chemical principles, (as laid down by De Candolle,) what rotation of crops may be most advantageously adopted on different soils, and what soils, by a rotation of crops, will yield all the advantages of which the alternate system is capable.

ON HAY MAKING.

From Hayward's Science of Agriculture.

Having observed that in a season when there was no rain whatever, and the hay had been made with rapidity, and carted within a short time after it had been cut, that a greater quantity was destroyed and injured, by being overheated and burnt, than in catching irregular season; that when hay had not heated in the stalk, it was frequently mouldy; that as hay lost its native green color, and approached a brown, it lost its nutritive qualities; and that altogether the making of hay, as usually conducted, was a very precarious and teasing operation: I determined on trying to arrange a system on some more regular and certain principles, in which I succeeded; and by adopting a certain and regular course of operations, was enabled to make my hay of a uniform good quality; and, let the weather be as it might, at a regular expense of

labor. And considering such a process not only of importance, as it ensures a more perfect quality; but as it affords a more certain protection against the injuries usually consequent on the uncertainty of the weather, and overheating in the stack, and that it thus removes two great causes of anxiety, it may be well worth the public attention.

In the first place as to the state of the weather, it generally happens at this season of the year that there are three or four days rain and three or four days dry; therefore on beginning to cut the grass, as it is well known that during wet weather grass may be cut, and suffered to remain in the swath for several days without injury; and it being desirable, where hands are plenty, to have a good quantity, or so much as will complete a stack in a day in the same state of forwardness; I should prefer beginning to cut during the rainy weather: however be this as it may, the swards should not be opened but on a certain fine day; and when this is done the grass should be well shaken apart and equally spread over the ground. As soon as the upper surface is dry, turn it well over; and in this operation great care should be taken to open and spread any cocks that may not have been divided in the first opening. This being done, commence raking into wind-rows, in time that the whole may be made into small cocks before night. The second day these cocks must remain untouched; let the weather be wet or dry; the third day, if the weather be certain and fine, throw the cocks open; but if the weather be wet or threatening, they may remain another day, or until the weather is certain to be fine for the day. The cocks should then be thrown, according to the crop, into beds of two or three rows and after three or four hours exposure, turned over; and taking time to gather the whole into wind-rows and cocks before night, let this operation commence accordingly, and none be left open: the day after this which in fine weather will be the fourth; the cocks must again remain untouched, or not be opened, whether the weather be wet or dry. On the fifth or next day, these cocks will only require to be opened for an hour or two, when they will be fit for the stack.—The novelty of this mode consists only in suffering the hay to remain in the cock the second and third or alternate days; and at first sight it must appear that so much time in fine weather must be lost, but this is not the case. Whilst the hay remains in cocks, a slight fermentation, or what is termed sweating, will take place and in consequence, after it has been opened on the third and fifth days, it will prove to be just as forward as if it had been worked every day. And the advantages resulting from this, are obviously the following; by shortening the time of open exposure, the color of the hay is more perfectly preserved, and consequently the quality; and the fermentations or sweatings which take place in the cocks, proves so much to have diminished that principle, or inclination to prevent its heating injuriously in stack; and the whole operation of making, whether it takes four or eight, requires three day labor only: and the hay being left in that state every night, in which it is the least possibly exposed to the injuries of the weather, and in which it may remain for a day or two in uncertain weather, without injurious exposure; much painful anxiety, and useless attendance of laborers are obviated.

**NORFOLK, ITS FACILITIES FOR COMMERCE
CONTRASTED WITH THOSE OF WILMINGTON,
&c., &c.**

For the Farmers' Register.

"Statistics of North Carolina.—In Mr. Bryan's speech I find a memorial relative to the inlet of Ocracock. It demonstrates that the annual product of the district of which the port is the vent, is, - - - - - \$5,000,000
That it employs of shipping in tons, 200,000
Of seamen, not less than - - - 10,000
That the expense direct and indirect incurred by this shipping at 1 per cent. on imports and exports is \$75,000
On the ships, - - - - - 60,000
Lighterage and detention at the Swash is, - - - 200,000 \$365,000
Or an annual tax of between 7 and 8 per cent. producing a loss in commerce of an immense amount, when, in fact, all this charge might not only be saved, but the commerce itself increased in an immense ratio.

Mr. Bryan proves the correctness of the idea, by stating, that staves commanded \$40 per thousand at Suffolk, (Virginia,) the head of the Nansemond navigation, while at Murfreesborough and Winton, on the Chowan (both about 30 miles distant from Suffolk,) they only sell for \$25. At Washington, Newbern and Edenton, they are scarcely worth \$10, while at Wilmington, they readily sell for \$18 and \$20. What is the conclusion? That, if the access to the Atlantic was as good by Ocracock as by Wilmington and Norfolk, the above \$5,000,000 worth of property would be shipped without the charge of the \$365,000, and that staves delivered at Norfolk are worth double as much as at Wilmington.*

When so clear a benefit to be derived from a little exertion, and compared with the object in view, so trifling an expenditure, it is no great compliment to the collected wisdom of the annually congregated councils of North Carolina, that they have so long been blind to a work they might so easily have achieved, and one that would instantly have produced the desired effect.

Every man that has ever been at sea, cannot but recollect the sailor's distich,

"If Bermuda let you pass,
Have a care of Hatteras,"

Nature, in placing Hatteras where she has, has interdicted almost to every port in North Carolina, the means of becoming the mart of extensive foreign trade. The Cape Fear river might be excepted, as offering a tolerable harbor—but, Wilmington has been so placed, as to preclude the possibility of its ever becoming a port of consequence. The difference in value of the same mate-

rial in Wilmington and Norfolk cannot be forgotten. It speaks volumes.

I assume this, and now proceed to prove, that not only might this \$365,000 *per annum* have been saved; but, that the commerce might have doubled; so, that the loss is two fold.

But, it is only to be done by a sacrifice, and hence I proceed to ask what will be that sacrifice?

It will be, the ridiculous notion, that each state must have a large importing port, while (to say nothing of the few ports of that description in the Middle and Eastern Sections of the United States,) Great Britain has not more than six, Ireland only two, and France not five. These countries with their enormous and overgrown populations, can do with these few large ports, while North and South Carolina and Georgia, with only about 1,000,000 whites and 700,000 blacks, (the latter consuming but little,) are to have three large importing ports. The ascendancy of Charleston, ever since the establishment of North Carolina and Georgia as separate governments, fully demonstrates this fact. The charters of the Charles and the Georges, have never altered this decree of circumstances. It is in vain, that the essential interests of these states are sacrificed to the imaginary lines drawn at the time, for the purpose of convenience and the increase of royal patronage. It is time they should all pull together, and by the establishment of two principal ports, uniting with Virginia, thus offer the means of erecting ports that may partially rival New York and Baltimore.

It is in vain that visionary men call on us to see what may be done by an expenditure on the Ocracock Inlet. The whole coast of the Carolinas is one dreaded by the seaman, and there are but two ports accessible to ships of war of any moderate descriptions. The patronage of government, royal and republican, and the result of circumstances, has, I repeat it, made Charleston what it is; but, the establishment of the inland towns on the healthy and purely watered sand ridges, and the increased accessibility to the Northern Cities, (its convenience and ease hourly augmenting,) has turned the attention of the consuming population of the three States to those cities for their foreign supplies. I maintain, that in a commercial point of view it is their interest to have this source of supply as near to them as possible, and, that in every point of view, it is their business so to sacrifice local prejudices, as to offer the best military port to the United States for the establishment of a marine depot.

This marine depot should be Beaufort in South Carolina. If Georgia had not been settled, the probability is, that it would have been the capital of Carolina. Bowen (1747) says "*it is already the station of the British squadron in these seas.*"

It is thus described by Drayton in his view of South Carolina, (p. 32, Charleston, 1802.)

"Broad, Coosaw, Port Royal, and other short rivers, are more to be considered arms of the sea than rivers of the country. By their various meanderings, they insulate nearly *one-fifth* of Beaufort district."

"Their waters are deep and their navigation suitable to heavy vessels of war; hence Broad and Port Royal Rivers, are supposed to be equal to the safe accommodation of the largest and most formidable navy."

"The bar or entrance of the Broad is almost a

* As a practical illustration, I would state what I have understood to be a fact. A ship (the Homer) trading between Charleston and Bourdeaux wanted staves. At Charleston they were not to be had; nor was she more successful at Wilmington; but, after all her expense at Wilmington, was compelled to go to Norfolk. This happened, as I have heard, last year. If the \$150,000 spent on the Swash, &c. had been laid out on a rail road across North Carolina, it would have rendered some service. Its outlay now is on a fruitless work.

mile wide, carrying a depth of nearly twenty-three feet at low water. The mouth of this river, at the sea, from Hilton Head on the one side, to the Hunting Islands on the other, is between seven and eight miles; and it penetrates a wide and nearly straight course, some distance into the country, insomuch that a vessel runs below the visible horizon in going up the river, as if she were at sea. Also, many rivers of less note discharge their waters therein. Hence, the appellation of *bay* would be a more appropriate term, for *this noble expanse of water*, than that by which it is at present known—that of Broad River."

As a commercial depot, it may become the exporting port of the western states; for, if a rail road can be laid down from the Ohio to Baltimore, it certainly can from the gulph of Mexico to Beaufort.

A rail road from thence to Augusta would be a cheap and easy achievement. It will be the subject of a separate paper.

The expense annually incurred by the loss of steamers in the western rivers to get their produce to market, and the amount of one year's damages arising from the dangers of the gulph of Florida, incurred by the underwriters, would pay the whole expense.

Hence, my proposition would be to lay down a railway of the simplest description; or, should the subject on discussion prove worthy, a better one of a permanent character.

We will suppose Newbern to be the centre of the commerce now impeded by the "deplorable" state of Ocracock, and destined to be eternally harrassed by the shoal of Hatteras.

The distance from Newbern to Wilmington, on the Roanoke is 60 miles—from thence to Murfreesborough, the same—from thence to Suffolk 40—in all 160 miles. A railway at \$1000 a mile would according to Mr. Fulton, be \$160,000 or not one half the expense annually and actually incurred by the attempt to navigate Ocracock. Should this succeed, a railway from Fayetteville to Raleigh, and thence through Halifax to Murfreesborough, where a union with the lower branch could carry all the produce of North Carolina to an easy market, and a port [Norfolk] that might become one of the most important commercial and military depots in the middle, would render the most useful results to the Middle States, while the commerce of the west will eventually confer the same benefit on Beaufort in the Southern States.

This may be a dream, and its writer be called a visionary—but, it can do no injury, even should it have no effect. And, as the motive in composing it is pure, I send it for insertion in the Camden Journal. I assume the title of one who in his own age was deemed a visionary, but, in ours is found well worthy of our gratitude and respect.

I confine my views to the *single* effect it would have on the commerce of North Carolina. As a measure tending to the general convenience of making it the great passage from the west to the east, and *vice versa*, travelling, &c. &c. much might be said. They are obvious. The distances stated are not perfectly accurate; but sufficiently so to elucidate the subject.

WORCESTER."

With the exception of Drayton's account of Beaufort and a paragraph relative to a rail road to

Augusta, the above paper was published in the Camden Journal for the 10th May 1828. Its actual bearing on the line of rail road that will have to be laid down in the first instance from Fayetteville, and at a future and no distant period, from the farthest west, is very important; and, it is rendered more so by the illegal attempt at imposition (for it deserves no other term) made by the corporation of the Charleston and Augusta Rail Road on the General Post Office.

To facilitate the correspondence of the country as well as to cheapen its conveyance, and add to its celerity, was a leading motive to an advocacy for the adoption of rail roads; and, especially to cheapen its conveyance must, originally, *have been* the object of the above named company. For, in Mr. Dexter's pamphlet we find the following observations:

"Sundry freights from Augusta, and the mails, - - - - -	\$10,000
Way passengers and travel from Greenville and Columbia, with mails, horses, carriages, servants, &c. equal to fifteen passengers at \$5, - - - - -	27,375"
In the latter instance on no mail is there any calculation made; but, the company is now asking the government for the conveyance of the mail from Charleston to Augusta, - - - - -	\$50,000

Or five per cent. on the capital they *have* expended, and six per cent. on what ought only to have been expended.

That such a charge was, until now, never contemplated is evident from the estimate they made of their net income, \$229,140, \$138,960, or \$120,960; and one of the directors (Mr. Miller,) ventures "to predict that before the expiration of three years, the mail will be transported from this city (New York) to New Orleans in eight or nine days."

What was the language of the Charleston Mercury?

"The Augusta *Courier* states that the Charleston morning papers are on its reading room files, by breakfast time the succeeding day; and that it is expected to get them on the evening of the same day, when the rail road is completed."

"The United States Mail and stage passengers were transmitted on it nine months before any other company transported it on a rail road; and it is questionable if any extended line of communication of an efficient and permanent character, whether rail road, turnpike, or canal, has been executed in so short a time, or at a cost approximating so nearly to the original estimate."

The cash receipts for April, 1833, freight and passage are upwards of \$3,600.

The total for May, 1834, was \$18,000.

This demand on the part of the company, and the recent report as to the financial condition of the General Post Office, will lead to the question, whether its revenues ought not to be pledged for the interest on, and final discharge of, the principal incurred in the formation of rail roads for the conveyance of the mail.

If a consideration of this kind is rendered imperatively necessary, by the conduct of the

Charleston Rail Road Company—if they are to charge \$50,000 for the conveyance of the mail for 140 miles, it would cost \$500,000 for the great mail from New Orleans to the eastern frontier of the United States. And at the very moment they are making this charge they are furnishing the means (innocently and unavoidably I grant) to thousands of individuals to take from the General Post Office that postage which, it is at such a heavy expense to collect. For I have no doubt, the letters sent by private hands from Augusta to Charleston, and thence to New York, have been so numerous as to deprive the office of a very large sum of money.

In conclusion, I would observe, that in one year, there have been paid in Alabama, \$157,000 for the conveyance of the mails. This sum would pay a five per cent. interest on \$3,140,000, or, at \$4,000 per mile, would make 800 miles of rail road; and a rail road this very year from any central point in Alabama to Beaufort, would have added from \$3 to \$6 value on 100,000 bales of cotton; or, from \$300,000 to \$600,000 to the inhabitants of the west. Hence, there would be no difficulty in thus constructing railroads—the government to furnish the surveyors, &c.—the state to furnish their equipage and subsistence—the post office revenue to be charged for two-fifths of the interest on the capital to be borrowed with the guarantee of the government of the United States for the purpose—with such a guarantee, it may be had in London for three per cent.—the state and individuals to furnish the remaining three-fifths, it being understood, that the two-fifths furnished by the General Post Office revenue, shall, provided the mail is carried free of any charge, be eventually relinquished on conditions to be hereafter determined on just and equitable principles, to the holders of the remaining three-fifths of the stock. This is perhaps, a feasible plan, and one, which, I trust, will excite the attention of the numerous and intelligent readers of your valuable publication.

SMEATON.

BEAUFORT, OR PORT ROYAL, SOUTH CAROLINA—ITS ERECTION INTO A NAVAL DEPOT—ITS CREATION INTO A PORT OF HIGH COMMERCIAL IMPORTANCE—AND THE RAIL ROADS NECESSARY TO THESE OBJECTS.

For the Farmers' Register.

There are few persons, to whom the capabilities of a country are a matter of the highest interest and observation, who must not be surprised to see the neglect which some places experience, and the profound insensibility with which the greatest natural advantages are oftentimes regarded.

Perhaps neither in the United States, nor any where else, is there to be found so striking an instance of inveterate ignorance and total want of perception, as in the case of the town and port of Beaufort, S. C. Early in the settlement of the country, it was justly deemed a port of importance; but the fear of the Indians and Spaniards in the first instance, and the erection of Georgia, into a separate colony, in the second, have united in obliterating Beaufort from the list of ports; although for ships of war, it is the only port on the whole coast of the United States, from Norfolk to Pensacola, worthy the name.

During the Revolution, it proved its value to the enemy, whose accounts state that Beaufort or Port Royal "is an island possessed of an excellent harbor, and many other natural advantages; from its situation also commanding all the sea coast from Charleston to Savannah."

Nor to the facilities it afforded a foe, were the defenders of the soil insensible. General Moultrie speaks of the fact of two small men-of-war, and a few troops possessing it, as a reproach to congress. However he forgot the then naval superiority of Great Britain; and in the actual state of affairs, an almost, if not quite equal land force—two circumstances that must be recollected; and especially as the general also states, that at "Mile End there is a narrow neck of land, about a mile from the town, not more than three hundred yards across, and on each side of this neck a navigable river;" and that of all the advantages the king's troops from their uninterrupted possession of the island could avail themselves.

Its facilities for a sea port and naval arsenal are thus rendered evident. I apprehend "two small men-of-war," will prove that the largest frigate could lie in the harbor with perfect safety; and the "narrow neck, only three hundred yards across, may possibly demonstrate that a canal across this neck would facilitate the scheme, to forward which, is the object of this paper—and certainly a rail road.

It will be remembered that so shallow is the draught of water at Savannah and Charleston, that generally speaking, such ships as the Washington, Great Britain, United States, France, and Sylvanus Jenkins, rarely come into either port. They carry from 1800 to 2400 bales.

It will also be remembered that there are large masses of pine forests at the Edisto, the timber cut from which might, by a transverse rail road from the Charleston and Augusta Rail Road at Branchville, be brought to Beaufort more easily than it can now to Charleston; and, when at Beaufort, could be more easily accommodated by the large timber ship, now impossible to be used in either the harbor of Charleston or Savannah.

It will also be remembered, that when the superiority of the road from Beaufort to Columbia is recollected, the distance will be the same between Columbia and Beaufort as between Columbia and Charleston; and if the transverse rail road can be effected, produce and merchandise can be transported at an infinitely cheaper rate.

The road from Beaufort to (say) Branchville, can be constructed at an infinitely less expense than that from Charleston to Augusta. The steps that will have to be taken at Beaufort, must be the subject of future discussion. At present, it should seem, that either a canal from the eastern to the western waters, that possibly may be made in such a way as to be a dock, (for the accommodation of shipping) and so placed as to terminate at a point as nearly opposite as possible to Boyd's Neck, or directly across the island at Mile End, would serve every useful purpose in the conveyance of produce to the shipping, and merchandise to the interior. However this part of the subject is *ad referendum*.

We will recur to the great end, which is to convey the produce from the Savannah at Augusta, to Beaufort, and the merchandise to the interior.

The first object would be the conversion, if pos-

sible, of the Union Turnpike into a cheap rail road, and its continuance to the waters of Beaufort. This would be useful, and to the final accomplishment of the scheme for rendering the port of Beaufort the great port on the Atlantic for the conveyance of all the produce of the west to its cis-atlantic as well as trans-atlantic markets, imperatively necessary. To perfect it, a cheap rail road from Port Royal to Hamburg and Augusta, will be requisite.

If the point of contact is to be the river at Boyd's Neck, it should appear, from the district map that a rail road might be laid down from that place to Robertsville, or between the heads of Bees' Creek and Great Swamp, at Riley's—thence to the church opposite Mathew's Bluff—thence to Mr. Cohen's bridge on Upper Three Runs—thence to Minor's Bridge—thence to Hamburg, and, in fact, Augusta—a distance of one hundred miles. The rail road to be of the simplest description: in short, to be a track road to pursue the undulations of the superficies, and to use the best and most solid ground.

This it is to be presumed may be laid down for \$2400 per mile, or \$240,000.

There is no doubt that as soon as the Athens and Augusta Rail Road can be finished, fully 200 to 220,000 bales of cotton will be brought down it; and if the road here proposed should be laid down, fully 400,000 bales of cotton* will be shipped at Beaufort; and further, that if, as in all probability will be the case, a road shall be made from the mouth of the Chatahooche to Savannah, it is very likely little short of 600,000 bales of cotton will be sent from thence to their destined markets. Of the returning merchandise, I take no notice.

SMEATON.

DOMESTICATED FISH.

The Easton Sentinel mentions that a trout of enormous size was recently presented to a dinner party at Bethlehem, Pa. by Mr. G. H. Goudie, and adds the following particulars—from which it seems that the rearing of fish in this novel mode may be conducted successfully.

"The trout measured 22 inches in length, 19 inches in circumference, and weighed 7½ pounds. It was raised by Mr. Jacob Schneider of the Lehigh Water Gay, who had kept it for the last six years in a trough in the second story of his house. We understand Mr. G. of Bethlehem has about 400 fine trout yet in his front house, measuring from 10 to 17 inches in length."

* Though I am no disciple of Webster or of Grimke, I think this the preferable way to spell "cotton," and request your compositor will leave my "cotton" in *statu quo*.

[The request of our correspondent is complied with at this time—but hereafter we beg leave to adhere to our own old fashioned mode of spelling "cotton," as the adoption of that above (even if correctly derived) would be attributed by most readers to the ignorance of the editor, rather than to the learning of his correspondent.]

WILD ONION—GYPSUM—LEGISLATIVE FARMING.

Fairfax county, June 17, 1834.

To the Editor of the Farmers' Register.

Your correspondent J. E. M. of Cambridge, Maryland, wishes to know what he is to do in relation to that pest, wild onion. The experience of thirty-six years induces me to believe that it cannot be rooted out. Perhaps if he could sift the earth for five inches in depth, and burn the roots he might get relief—yet a neighbor of mine believes that the ashes of that pest will reproduce the root.

I once ploughed a field ten or eleven inches deep, with the hope of smothering this root, and succeeded so far as to destroy the greater part: but that which was left soon filled up the vacuum. I have after various and repeated experiments, settled into the following practice. Cultivate the land in corn, or seed in oats, and never give your last ploughing for wheat, or any fall crop, until 10th October. The roots will then have forced up all their shoots to a fresh and strong growth—and you will so far cripple the plant as to have no seed from it at the following harvest.

As I find many opinions in your publication about the quantity of plaster to be used upon an acre of land, let me say how I have used it. I have applied it every month in the year, varying the application from one to ten bushels per acre. Ten was injurious—one not enough. The best mode of using it is from one to two bushels in September or October, and the same in April or May. The whole amount at either season will not do so well; yet, in either way, a young farmer might be excused if he lost sight of his land marks, and became doubtful of being upon his own old naked farm.

You and your very respectable correspondents will excuse me for a few words on "legislative farming." It will not do—the state has no money for imperial experiments—and I venture to say, that if you spend ten hundred thousand dollars in this way, you will blush in the retrospective view of it. I mean nothing other than perfect respect sir; but, old as I am, had I that celebrated ram's horn of Joshua, which he was used to blow around the camps of his enemy, I would go around this state bare-footed, and sound the alarm against governmental experiments. I am almost ready to say that I would make governmental experiments a penitentiary offence. What are the half million of farms that are spread over this state but experimental farms? Does not every cultivator apply his labor with an eye to the result? What more then is wanting, as relates to practical and profitable cultivation, than to communicate through your paper, what has been done, and the result in *dollars and cents*? Is it necessary that we should have a score or two of officers with fat salaries to learn us how to farm? Poor mortality! how often have I seen thee *create* maggots in cheese to make it better! Could I raise letters of polished brass upon the rainbow, they should warn the good people of Virginia to stand aloof of office, and office seekers.

Our corn is mending—our oats better than we looked for—and our wheat, though one week later than usual, is quite as good as we could have expected. Upon looking over my memorandum

book I find that seven years ago I cultivated the same field in corn, and that upon the 8th day of June, we ceased to cultivate it: this year we must cultivate it to the 15th July—so much for difference of seasons.

JEREMIAH.

CALCAREOUS ROCK IN PRINCE EDWARD.

To the Editor of the Farmers' Register.

In the first number of your first volume, is a communication from me, on the subject of argillaceous marl, containing also such a description of the local peculiarities of the region in which this substance is found, as I could give, without a regular knowledge of geology. In a note appended to that communication, you were pleased to regard the discovery of this mineral manure, as promising benefit to the agriculture of our state. Although the expression of this opinion, was highly gratifying to my feelings, I considered it best, on account of the necessity of directing my laboring force to other matters, and the extreme difficulty of suitably operating on so excessively tenacious a clay, to await the result of applications already made, before making preparations for the general diffusion of marl over my land. I moreover hoped, that by occasionally devoting some time to the search, I might discover something richer in calcareous matter than the weak marl already found; for, in the note above alluded to, you remark, that "the sources from which the fluid calcareous matter exudes, and which concretes by age, are probably much richer; and searching for them by boring would probably repay the labor." I have accordingly spread but little marl for the last year, but have been watching, as I found opportunity, for something better. It is proper, however, that I should state, that I can show very promising young clover on land manured only with marl, which I considered, two years ago, as poor as any in this county.

Having succeeded, as I think, in discovering one of the sources of the marl on my land, I lay an account of it before you for publication, if you think proper.

In a ditch, mentioned to you in a previous letter, now washed into a deep gulley, I found a considerable quantity of selenite and calcareous concretions imbedded in the clay. These materials, I observed, could be traced from the mouth of the gulley, in considerable abundance, up to a ledge of rock crossing the gully; but scarcely any such things could be discovered above the ledge. Moreover, immediately about the ledge, was a deposit of marl, much richer than any I had previously seen on my land. These circumstances led me to suspect that the rock itself was calcareous; and on breaking a piece of it, and applying acid, I witnessed a considerable effervescence.

The ledge at its outcropping appears to be five or six feet in thickness. The rock on the outer surface is of a rusty yellow, or light brown—inwardly of a dark purplish gray color. On polishing, it becomes nearly black. Being susceptible of a fine polish, it may be considered as a species of marble. When undergoing a little brisk friction, it emits a strong odor resembling that of bone filings. According to the analysis made by my young friend Mr. George W. Dame, of Hampden

Sydney College, it contains the following constituents and proportions in one hundred grains.

Carbonate of lime,	52. grs.	
" " magnesia,	4. "	
" " soda,	6. "	
Oxide of iron,	8. "	
Sulphur,	3.	} In the form of sulphuret of copper in the rock.
Copper,	4.5	
Manganese,	2.	
Silica,	8.	
Alumine,	10.	
	97.5	
Loss,	2.5	
	100.	

I believe that common gypsum and limestone are not often found in a coal field, but that in their crystalized forms (as selenite and marble) they are frequently accompaniments of coal. I suspect, that much of the hard dark gray rock, dug from the coal pits in the counties below this, would be found, on the application of acids, to be calcareous.

Besides the ledge of rock above mentioned, there are several others of much the same appearance, which effervesce equally with acids; but they have not been regularly analyzed. After a suitable application of heat, (viz: not very intense but long continued) they may be slaked into a fine powder, much resembling ashes. They readily become vitrified by the strongest heat of a furnace.

Whether this rock is to be useful, either in agriculture or masonry, time and experiment must determine. I have, as I deemed it my duty to do, stated facts, because I suspect that such rocks abound in this middle country. I conclude with hoping that others will aid in the investigation of such matters. A few cents worth of muriatic acid would enable any gentleman to try a great many rocks and earths, whether they be calcareous.

W. S. MORTON.

Near Farmville, July 3d, 1834.

REMARKS ON THE DISCOVERY OF CALCAREOUS ROCK IN PRINCE EDWARD, AND OF THE GREEN SAND IN THE LOWER COUNTIES.

The foregoing communication furnishes a new example of the discovery of valuable mineral materials for manure, produced by zeal being directed to such investigations, although unaided, as the writer states, by any regularly acquired geological knowledge. Still, imperfect as may be Dr. Morton's means for these pursuits, and confined as his views have necessarily been to the narrow limits of his own neighborhood, he has now and previously made known facts, and stimulated others to seek and to reach similar results, which cannot fail to prove of great importance to the agricultural improvement of Virginia. If these several facts had been discovered and announced by a regularly instructed geologist and chemist, their novelty and importance would have been sufficient to add something to the name of highest reputation: and if such labors had been obtained by the direction, and at the expense of the government, that expense would already have

been amply compensated. In making these remarks, it is not so much our design to do honor to Dr. Morton, however well it may be merited, as to call attention to the value of results obtained by such feeble means for investigation, compared to what might be done, by a proper geological survey of all the different regions of the state, such as Maryland has already undertaken. In the mean time, while our legislature slumbers over the most urgent claims of agriculture, or rejects them with impatience or contempt, let individuals at least do something to bring our mineral resources for improvement to light—and various examples to be found in the *Farmers' Register*, prove that in this manner much has been done, and may yet be done, by such means alone. If the establishment of this journal had done no other good than bringing out these discoveries, its value to the community would have been at least equal to the cost of its maintenance.

Among the most valuable of these discoveries we believe will be found that of the *green sand*, announced in the communication of Professor Rogers in the first part of this number. We rejoice that this and other kindred subjects have been undertaken by an investigator having suitable scientific attainments, as well as zeal for the pursuit. This discovery is as yet but dawning, and the examinations of many persons guided by the directions given in Mr. Rogers' communication, may be usefully employed to aid him in the pursuit. These aids we earnestly hope will be afforded: and those who may offer them, will no doubt serve their own private interests, as well as that of the public, by such labors. We will take pleasure in transmitting to Mr. Rogers any specimens which it may be more convenient to send to Petersburg, or to Shellbanks, than directly to him at William and Mary College.

These latter remarks would have appeared better placed immediately after the piece to which they refer. But our silence then was caused by the expectation (which unavoidable circumstances have compelled him to disappoint) that the author would add the result of an examination of the stratum of "gypseous earth," which we have believed to be very similar to, if not identical with the *green sand* or *Jersey marl*. This examination will yet be made: and we feel confident that there, and still nearer the falls of the rivers, will be found in the greatest quantities the earth described as *green sand*.

FERTILIZATION OF OLD LAVAS.

Among the practical consequences that result from the facility with which Cacti strike from cuttings, there is one which deserves to be noticed, on account of its importance, viz: the manner in which the *Opuntia* (*European Indian Fig*) is employed to fertilize the old lavas at the foot of Mount Etna. As soon as a fissure is perceived, a branch or joint of an opuntia is stuck in, and the latter pushes out roots, which are nourished by the rain that collects around them, or by whatever dust or organic remains may have collected into a little soil. These roots once developed, insinuate themselves into the most minute crevices, expand, and finally break up the lava into fragments.

Opuntias treated in this manner produce a great deal of fruit, which is sold as a refreshing food throughout all the towns of Sicily.—*De Candolle*.

AMHERST AGRICULTURAL SOCIETY.

For the *Farmers' Register*.

At a meeting of a portion of the citizens of Amherst county, convened agreeably to public notice, for the purpose of organizing an Agricultural Society.

Capt. Edmund Penn was called to the chair, and Robert Tinsley appointed secretary.

The society then proceeded to the election of officers for the ensuing year; whereupon,

Dr. James Powell was duly elected *president*; John Jaquelin Ambler, *vice president*; Howel L. Brown, *treasurer*; Arthur B. Davies, *secretary*.

James Powell, John J. Ambler, John Thompson, Arthur B. Davies, Howel L. Brown, Joseph Pettyjohn and Robert Tinsley are appointed a committee to report to the next meeting a constitution and a system of bye-laws for this society.

Ordered, that Judge Lucas P. Thompson be requested to deliver an address before this society, on the 21st day of July next, at 10 o'clock, in furtherance of the objects of the society, and that the secretary do furnish him with a copy of this order.

The society is adjourned, till Monday, the 21st of July next, 10 o'clock. ED. PENN, Chair.

Robert Tinsley, Sec'y.

ON HILLING CORN.

From the *Courant*.

As the season for hoeing Indian corn approaches, the writer of this article takes the liberty of suggesting to farmers in his vicinity, a few hints relative to earthing or hilling up at the second and third hoeings, or as it is commonly called, *half hilling* and *hilling*.

The practice of most farmers within my acquaintance is, at half hilling to accumulate the earth from two to four inches, and at hilling from three to five inches more, making each hill a pyramid of about seven inches elevation. The reason offered in support of this practice is, that the corn will stand firmer and more erect, and therefore be less liable to be broken down by the wind and rain.

More than fifty years' experience in this branch of agriculture has taught me that this is erroneous both in theory and practice. By accumulating earth upon the roots of the corn they are deprived of that influence of the air and sun which are necessary to a healthy and vigorous growth.* Every one acquainted with the natural growth of this plant, must have observed the peculiar formation of the *brace roots* which sprout upon the stalk in a circular form a very little below the surface of the ground, radiating from the stalk in every direction. In like manner are the stalks of wheat, rye, barley, oats, &c. furnished with their brace roots, and

* It is well known where excavations are made in constructing canals and rail roads, and the earth to any considerable depth thrown upon the roots of large and healthy trees, it causes their death within a year or two, by placing their roots below the influence of the air, and warmth of the sun—the same effect is produced, and from the same cause, where timber land is flooded by water.

stand in no need of hilling up to give them strength and firmness in their position. They are evidently designed to stay the stalk and hold it in an erect posture, not unlike the shrouds of a ship to sustain the mast. To render these braces sufficiently hard and strong to answer the design of nature, they must have the influence of the sun and air; but when buried by several inches of superincumbent earth, they become soft, weak, and brittle, and nature to remedy this evil sends out another set above the former. These occasion an unnecessary waste of the nourishment of the plant, and at that advanced season of the year never become sufficiently indurated to perform their office to the best advantage.

If those farmers who may take the trouble of reading this article, should doubt the correctness of this reasoning, they are respectfully invited to test it by experiment upon a few rows or hills. For many years past the writer has practised upon the principles here recommended, and has uniformly been successful in his crop.

It may also be remarked that great injury is done both by the plough and the hoe at the time of hilling, by breaking and wounding the long fibrous roots so necessary to the growth and strength of the stalk. After the weeding or first hoeing, neither the plough or the hoe should be allowed to penetrate any deeper than is necessary to destroy the weeds and grass.

In cultivating the potato, the same reasoning so far as it respects the accumulation of earth, will apply—the bulb is formed simultaneously with the blossom bud. If, after that period there be much hilling up, the first formed bulbs grow but little; being out of the reach of that warmth and air which are required for a perfect growth, and another set above them is produced. Hence it is that by this mode of culture so great a proportion of the crop consists of small bulbs. Every cultivator must have observed that the largest potatoes in the hill are invariably found near the surface of the ground.

CORNPLANTER.

A GOOD CROP OF TOBACCO FROM NOTTOWAY.

From the Richmond Whig.

A crop of 6 hhd tobacco, made by Mr. John Webster of Nottoway county, was sold at Shockoe Warehouse, on Tuesday last, [June 3d] at the following prices:

1 hhd at	\$13 50
1 hhd at	12 50
1 hhd at	11
1 hhd at	10 25
1 hhd at	9 25
Short tobacco 1 hhd at	6

Average—\$10 41.

THE WILD OR CANDLERBERRY MYRTLE, A REMEDY AGAINST THE DEPREDATIONS OCCASIONED BY THE WEEVIL.

From the Southern Agriculturist.

Dear Sir,—Information on all and any subject, connected with agricultural pursuits will, I presume, find admittance into your periodical, and although the notice may be of apparently small matters, yet to some one of your readers, it may be new, and let me add, valuable. I am induced to make these remarks from the inconvenience I suffered for many years, from the destruction of my

corn by weevil, and the total absence of them now, in consequence of the application of a very simple remedy. The land which I plant in corn is low, and requires almost as much draining, as the river lands, but is productive, and yields abundant crops. Whether it is owing to the location of the land, or other (to me) unknown causes, I am unable to say, but the fact is, that the corn is often taken from the field with a great many weevil in it. No injury seemed to result from their residence in it, while in the field, or during the cold weather, but as soon as the summer's sun had shed his genial warmth upon us, these intruders gave notice of their existence, by commencing the work of destruction. Upon several occasions my provisions were materially injured, and much complained of by the consumers—I tried a variety of remedies, without effect. Late planting, and early planting, were both suggested and tried; the land was all broken up deep in the winter, with a plough; the seed was coated with tar and soot, and finally was brought from one of the sea-islands at a distance and planted. The crops, I think, were improved by each of the remedies in quantity, but the enemy still retained his position, unmoved, and apparently immovable. I was one day mentioning the circumstance to a friend, who told me that he had understood, that the wild myrtle, (*Myrica cerifera*) was a sovereign remedy for this seemingly incurable disease. At this time the destruction had commenced, and the insects were to be seen in every direction; a quantity of myrtle was procured, and spread over the top of the corn, and directions given to follow it up, if any effect was visible. My removal to town for the summer, prevented my attending to the business any farther, and I learned upon inquiry in the fall, that "it seemed to check the weevil in some degree." This was not satisfactory, and as the corn in the field was apparently more than usually infested, I determined to give the experiment a fair trial. The corn-house was emptied, and swept, and washed with boiling water; the floor was then covered with myrtle; a layer of corn about a foot deep was then brought in, and then a layer of myrtle, and this management continued throughout the whole harvest, observing to cover the top of the corn with a bed of these little bushes. During the winter I several times examined the corn, near the door, and saw no weevil, yet I was fearful, that in the body of the house, the mischief might still be going on. Late in the spring we began to use the corn freely, and still found no weevil; the crop was eventually consumed, and was to the last, entirely free from insects of all and every kind.

This was to me satisfactory, and the rule has been uniformly observed of strewing the house with myrtle, and no weevil have since been seen. My corn-house is divided into two bins, and an entry; and this year I had planted a small field alone, and desired that it might be kept separate. Into this entry it was thrown, and no myrtle was put with it, but the two bins were as usual well supplied. Upon my examining the corn-house, I found the corn in the entry filled with weevil, while that in the bins was perfectly free from all insects. The corn was immediately removed, and though filled with insects, was divided between the two bins, and myrtle plentifully strewed over the top of each. I am now eating the corn, and the weevil are no where to be found.

This last accidental experiment is more convincing than either of the others; here the two bins were free from weevil, and the corn which was separated from them, only by a loose board partition was filled, and I have little doubt, would have been rendered unfit for use before the summer was over. Perhaps, Mr. Editor, in giving you and your readers the information detailed in this paper, I have been carrying "coals to Newcastle;" if so light your spirit lamp with it, and I shall be satisfied, as my only object is to do good and not to see myself in print.

With my best wishes for your restoration to health, and success in your pursuits, I remain your friend. z.

ON THE EXCRETORY POWERS OF PLANTS.

By Mr. Towers, Author of the Domestic Gardener's Manual.

From the [British] Journal of Agriculture, of 1831.

The paper, at page 320 of this volume of the Journal, entitled "De Candolle's Theory of the Rotation Crops,"* refers to one of the most interesting disquisitions that has ever claimed the attention of the agriculturist. It is on a subject that may perhaps stimulate the farmer to reflection and experiment, and tend to abate that prejudice which has but too extensively induced the cultivator to view the reasonings, and even the discoveries, of scientific men, as so many innovations upon the beaten path of routine practice.

Upon these considerations, I hail the appearance of this article, which I have perused and reperused, again and again, with fresh satisfaction. But, while I earnestly recommend the intelligent agriculturist to study it with deep attention, and cordially join in the hope expressed by the Editor, "that the chemists of our own country will prosecute the interesting investigations of M. Macaire;"—while I thus urge the farmer to study, and the man of science to investigate, the theory, it is but justice to myself to vindicate my own claim to originality,—comparatively so at least in respect to the hypotheses brought forward at this time, and said to be established by facts. I disclaim wholly the idea of detracting from the merits of any author, or of building upon any man's foundation; but when I perceive that a theory is advanced or claimed as recent, which I can prove, beyond a doubt, to have been pointedly and distinctly advocated by me above three years since, I conceive that I am imperatively called upon to make public, by the means at my command, those remarks upon the excretory powers of plants, which I penned in the year 1830.

They who are in possession of the *Domestic Gardener's Manual*, will observe, that when noticing the "Rotation of Crops," at paragraph 539, page 430, of that work, I add,—"*A rotation of crops is considered by most to be of absolute necessity; and chiefly on the supposition that each plant draws a somewhat different nourishment.*" I am prepared to admit that each individual vegetable elaborates its own specific nutriment; that is, it induces decompositions, which afford it a supply congenial to its own peculiar habit and constitution. I also advocate a rotation or change of crops,

not, however, on account of the necessity of recruiting an exhausted soil, but for the reasons adduced at paragraph 499, under the article "*Raspberry.*"

Referring to that paragraph, page 397, we find—

"Experience proves, that to have a constant supply of fine fruit year after year, the ground must be frequently changed. Thus, after the raspberries have borne fruit four or five years, one or two roots should be taken up, the strongest suckers selected, and immediately planted in fresh ground. Whenever raspberry plants are removed to another situation, the old ground ought to be well manured, deeply digged, and turned; and then it should be placed under some vegetable crop. By this mode of treatment it will be brought into a condition to support raspberries again in two or three years. *This is a curious and interesting fact, one which proves that it is not solely by exhausting the soil that certain plants deteriorate, if planted in the same ground, year after year; for, were this the case, manure would renovate the ground; but it fails to do so, and thus, if peas or wheat, for example, be grown repeatedly on a piece of land, the farmer may manure to whatever extent he chooses, his crops will dwindle and become poorer and poorer.* This is remarkably the case in the Isle of Thanet, where, to use a local term, if the land be "*overpea'd,*" it becomes as it were poisoned; and if peas be again planted, though they rise from the soil, they soon turn yellow, are "*foxed,*" and produce nothing of a crop.

"To account for this specific poisoning of the soil, we must suppose that particular plants convey into the soil, through the channels of their redudent vessels, certain specific fluids, which in process of time saturate it, and thus render it incapable of furnishing those plants any longer with wholesome aliment. In fact, the soil becomes replete with feculent or excrementitious matter; and on such the individual plant which has yielded it cannot feed. But it is not exhausted; so far from that, it is, to all intents and purposes, matured for a crop of a different nature; and thus, by the theory of interchange between the fluids of the plant and those of the soil, we are enabled philosophically to account for the benefit which is derived from a change of crops."

It was thus that I expressed my opinion in 1830, and by the above quotations of two passages from the Gardener's Manual, I think that I have uncontestedly established my claim to priority. It is stated in the article on M. De Candolle's Theory, (page 324,) that "*Brugmans had supposed a portion of the juices which are absorbed by the roots of plants are, after the salutiferous portions have been extracted by the vessels of the plant, again thrown out by exudation from the roots, and deposited in the soil.*" This may be the fact, nor am I disposed to deny that two men may entertain the same ideas upon any subject, without any intercourse with, or assistance from, each other. Still I assert, that the theory I adduced was, at the time, purely my own; for, I cannot trace in any accredited author, the least hint of the facts alluded to.* Indeed, in a letter received in May last from

* For the theory of De Candolle referred to above—see page 317, vol. 1, Farmers' Register.

* The opinion of Professor Lindley, published in 1832, in his "Outline of the First Principles of Horticulture," is at page 19, in paragraphs 52, 53, 54, and 55, thus expressed:—

the venerable President of the Horticultural Society of London, that gentleman evinces his opinion of the absolute novelty of the theory; thus, "the continental naturalists have lately imagined that trees emit some matter into the soil, of the nature of excrement, which subsequently proves noxious; but I do not assent to this opinion."

What Brugmans states is in accordance with my theory, and with that now advocated by M. De Candolle; in fact, I do not see how and in what way we can by any possibility support, in *all its* bearings, the theory of the rotation of crops, otherwise than by that of the excretory power of the roots of plants, and the consequent effects produced upon the soil.

I shall now shortly explain what I mean by "*the interchange between the fluids of the plants and those of the soil*;" and then proceed to notice particularly some of the leading facts stated in the review of the new theory.

I have throughout my work maintained that the vital powers of every living vegetable are stimulated by the *electrifying principle of light*; by the agency of which, the nutritive substances being about the radicals, are decomposed, and then attracted and propelled into the recipient vessels of the roots. The element so prepared, I consider and designate the "*fluids of the soil*," which, by the same exciting energy, are, I conceive, carried upwards through the cellular system, till at length they are deposited in the leaves, wherein they are elaborated, and become the vital, nutritive, *proper* juices of the plant. These juices are then, I argue, carried back from the leaves, and distributed in due specific proportions, into cells or vessels appropriated to every required function of the plant; but certain portions are carried to and through the roots, and propelled into the soil; not, however, in the simple bland state of those taken up by the vessels of supply, but imbued with peculiar compound, odorous, and sapid qualities, the effects of the process of elaboration within the vessels of the leaves of the bark. These *exuded juices* I style the "*fluids of the plant*;" and as the processes of supply and ascent, and those of return and exusion, are unintermitting and coincident,—the results of the same mighty electrifying principle,—I view and describe them as acting *interchangeably*, as by the law of electric *induction*, whatever is excited *positively* induces a *negative* condition in a body immediately within the range of its energy. It is evident that the vital principle stimulates the decomposition of the previously inert matters of the soil about the roots of plants, and that to a considerable distance, otherwise no food could be introduced into the inconceivable fine vessels of the fibrils. This food is pale, void of taste or odor; whereas the prepared sap, which distributes the nutritious matter to every part of the vegetable, is frequently possessed of color,

"Spongioses secrete excrementitious matter, which is unsuitable to the same species afterwards as food: for poisonous substances are as fatal to the species that secrete them, as to any other species."

"But to other species the excrementitious matter is either not unsuitable, or not deleterious."

"Hence, soil may be rendered impure, (or, as we inaccurately say, worn out,) for one species, which will not be impure for others."

"This is the true key of the theory of rotation of crops."

flavor, and scent, and these to a high degree in many species; and the portion that is carried down to the roots, is found to emit a peculiar and very perceptible odor.

In the present state of electrical science, it will scarcely be denied that a subtile fluid pervades all matter; that it is present in, and perhaps the exciting agent of, all chemical action; and, moreover, that it is the source of all the magnetic phenomena. Will it then be deemed a mere play of the fancy, to suppose that the whole of the processes of the ascent of the raw sap, the elaboration of that sap, its distribution, the exusion of a certain portion of it, are specific electrical phenomena, produced almost instantaneously, and inducing one another? I confess that I see no possibility of otherwise accounting for the agency and effects of vegetable vital action, unless, indeed, we consider the vital principle of plants as resembling that of the animal creation, and consequently as including a sentient and discerning faculty, a power of volition and of choice!

Without dwelling upon an inquiry into the precise nature of vegetable vitality, I shall take it for granted that the vital principle is stimulated by external agency, and that all the functions of the plant are at least *excited* by solar light and atmospheric energy, whereby attractions are produced, and decompositions effected, with regularity and precision, and in an order that is exactly suitable to the constitution of each individual vegetable. With this principle before me, I shall now revert to the hypothesis of M. De Candolle, in connection with, and supported as it is by, the experiments of M. Macaire.

The former philosopher conceives that the true theory of the rotation of crops may be found in the fact, that plants exude more or less of excrementitious matters from their roots; and M. Macaire has followed up the idea by a variety of chemical experiments, whereby he appears to have ascertained that certain plants—one of which was *Mercurialis annua*—took up, by the absorbent powers of their roots, portions of acetate of lead or of lime, which they again yielded to the distilled water, in which the roots were subsequently immersed; and that the fact was proved by chemical reagents or tests best calculated to detect the smallest portions of each of these substances.

"The roots being partly placed in lime-water and partly in pure water, the plants lived well, and the pure water soon showed the presence of lime by the oxalate of ammonia." Oxalate of ammonia is readily prepared by dissolving a portion—say one drachm—of carbonate of ammonia in as much warm rain or distilled water as will take it up in solution. Into this, a quantity of pure oxalic acid dissolved in water is to be dropped, till effervescence ceases, when it may be concluded that a neutral salt is formed. This salt can be produced in crystals; but as this is not required for the experiment in question, I shall not dwell upon it.

The saline neutral liquor being simply filtrated through blotting-paper will amply suffice as a test; and, indeed, it is one of the most subtile tests for the presence of lime in solution that we possess; perhaps one-hundredth part of a grain of lime in a gallon or more of pure water would be detected by it.

With this reagent (and it is one of those which every analyst of the soil should possess himself

of,) the pure water, wherein a portion of the roots grew, was tested, by letting fall a drop or two of the liquid oxalate of ammonia into it; when a milkiness, arising from the union of the oxalic acid of the test with the lime exuded from half of the roots into the pure water, was produced. Such, we may conclude, was the nature and result of one of M. Macaire's experiments, and certainly it is very conclusive. *Oxalate of lime* is an almost insoluble compound; it therefore is manifested in the form of a white powder; the *ammonia* of the test is liberated, and distributed through the bulk of the water.

These chemical experiments are delightful in themselves, and possess very great interest; but, in the present case, an inquiry of greater moment presents itself. Whence came the lime, admitting the fact to be as stated? Nine-tenths of the water of wells, and even of many rivers, contain lime in one form or another, and to a certain extent. But the recital states that one portion of the roots was placed in lime-water, and another portion of the roots of the same plant in pure water. By this latter term, a chemist understands *distilled*, or perfectly pure and filtrated rain-water, collected in glass or glazed vessels, as it falls from the clouds. In such water lime will scarcely be traceable; and, therefore, whatever portion was detected in the pure water, must have passed through the media of the vegetable vessels. "Similar results were made with a weak solution of marine salt" (common table salt,) "and with a like result."

The test employed is not stated in the paper, but I conclude it to have been the *nitrate of silver*, because that chemical preparation is one of the most delicate tests for muriatic acid, in consequence of the strong affinity—or rather electro-chemical attraction—which is exerted between that acid and silver whenever the latter is held in a state of solution.

Many other experiments are referred to, and all have tended to prove the correctness of the opinion, that a *rotation of crops is required, in consequence of the excretions from the roots of plants.*

Having thus adverted to a few of the experiments mentioned in the article, I shall now state the facts which led me to the opinion that I formed above four years since, and in which I have been confirmed by repeated subsequent observations. It was notorious that many crops could not be made to succeed, if repeatedly placed in the same individual portions of ground. Manures were found ineffectual; and, therefore, the deterioration of the crops could not proceed from a want of sufficient aliment. The necessity of a rotation was observable chiefly in the farm; still, however, the garden afforded many instances confirmatory of the fact. As I was writing solely upon the produce of the garden, it occurred to me, when treating upon the singular and sudden deterioration of the raspberry, that to the same causes which produced the destruction of a fruit-bearing shrub, might be ascribed the debility that ever followed the successive repetition of a corn crop upon the farm. I had observed that the soil about the roots of raspberries acquired a peculiar color and texture; it differed from that of any other soil of the garden: manure was freely applied, and still the plants became weaker, shorter in growth, and less fruitful. I did not know the age of my plants, because the bed had been formed before I came into possession

of the ground; but I really ascertained that plants of the white Antwerp variety, which I purchased and placed along-side of an outermost row of the bed, would not take to the soil; and about the period that the whole bed became almost worthless, I saw several remarkable fine plots of the shrub, and conversed with the owners, from whom I learned a variety of facts, which, though detailed in the plain, unphilosophical manner of cottage gardeners, led me to conclude that the raspberry plant deposited feculent matter in the soil, which, after a certain period, rendered the soil utterly unfit to support the shrub and enable it to produce fine fruit. Reflection and recollection, at the same time, informed me that a variety of vegetable crops imparted a manifest odor to the soil; so much so, that in digging up a crop, the whole plot was perceived to be imbedded with a specific aroma. I confirmed these facts, and then wrote the passages that I have quoted in the early part of this article. Subsequent observations and much experience have confirmed the opinion that I then noted down; so that the reader may rely upon the correctness of the following facts. When peas are sown in pots or boxes, with a view to future transplantation into rows or plots, the vessels become replete with matted roots. Upon removing the peas to their place in the garden, the soil they grow in is found to be completely saturated with odorous matter; it emits a powerful peculiar smell, that cannot be mistaken. The kidney-bean (*Phaseolus*) produces a similar effect, but the odor differs from that of the pea: the same may be observed in plants of the leguminous tribe in general; and I have little doubt that this tribe will be found particularly to require a frequent change of situation. I have already referred to a well known effect produced by the pea upon the shallow, loamy soil, of that eastern point of Kent, called the Isle of Thanet; and the experiment of M. Macaire with the bean (*Vicia Faba*) is in accordance with, or at least may be adduced in support of, the facts named above.

The Brassica tribe, cabbage, broccoli &c. also impregnate the soil with a marked and peculiar odor.

From whence do the gases which produce these effects proceed? Many, perhaps, will be inclined to suppose that it is not the soil which gives forth the smell, but the root itself; but how can any plant retain within its substance an odor that is externally sensible? If a flower, a rose for instance, be held at some distance from the nose, the specific aroma of that delightful flower becomes manifest; but could this be the case if the rose did not emit the gaseous vapor which disseminates the odor? Whatever it be that yields odor or scent, whether that be agreeable or offensive, must be material, because it produces a positive effect upon one of the senses; and, moreover, the odor of flowers is very frequently productive of faintness and debility! If the roots of a plant radiate odor, the earth about them, being the medium in which they germinate, must receive the odorific matter; and, in fact, a spade can scarcely be put into a plot of soil that has borne a crop of some vegetables, without liberating, as before stated, a volume of vapor sufficient to be discerned, at the distance of a foot or more, above the surface.

Again, if soil be perfectly fresh, that is to say,

raised from the depth of two or three feet below the surface, it will generally be found of a different color from the old worked soil of the garden or field. A hazel-loam, which is a combination of sand; aluminous and chalky impalpable matter, colored by oxide of iron, is frequently found at the depth mentioned, and may be considered pure virgin earth. If such soil be planted with strawberries, or almost any vegetable crop, its color will undergo a change, and become many shades darker. Is this change of tint effected by carbonaceous matter excreted from the roots, by the decomposition of carbonic acid derived from the air, or by the partial de-oxidation of the ferruginous constituent of the earth? The latter may probably operate to a certain extent, but I hold it more philosophical to conclude that the change in color is to be ascribed to hydrogen gas (holding, perhaps, carbon and other matters in solution,) emitted from the roots into the soil, and therein effecting chemical decompositions by specific elective, or rather electric attractions.

This blackening of the soil may be suspected by some to proceed from the decomposition of carbonaceous matters; and it is highly probable that it does so proceed; but even admitting that manures have been placed in the soil, their decomposition and absorption, according to the received opinion, by the roots of the crop, ought to abstract the carbon from the soil, and not to deposite it therein! But I am supposing a case wherein pure virgin sandy loam, without manure, is employed; and, to simplify the experiment, I say—let a middle-sized garden-pot be filled with such soil, and in it let a single vigorous strawberry plant be placed in the month of February, and be regularly watered; by the end of August following, that is, about the period when the growing season is almost passed, the soil will be found of a deeper color, by many shades, than it exhibited when placed in the pot.

My experience has taught me this fact, and I ascribe the effect to the matter emitted by the roots into the earth. Earth so colored, is not, I conceive exhausted: it is doubtless changed, and in time would be incapable of supporting the vegetation of the plant which had deposited the coloring matter within it, but in respect to mere abstract quality, it is unquestionably richer than it primarily was, having received more than it gave out, and is, in fact, manure for another species of vegetable.

This is in accordance with the very valuable experiment of M. Macaire, which indicates that yellow coloring matter was afforded by the bean to pure water, which yellow matter was taken up by "plants of wheat," that "lived well," and afforded evidence of having "absorbed a portion of the matter discharged by the first" (the beans.)

My own reflection, and observation of facts, have satisfied me that certain plants do emit hydro-carbonous compounds into the soil, that poison it, inasmuch as refers to themselves individually; but such experiments, as those of M. Macaire, are invaluable, and ought to be persisted in, in conjunction with daily observations of the soil of the field and garden, till the fact in all its bearing be established. I for one intend, if life be spared to the next spring, to follow the advice given at page 327 of this volume, and to "prosecute those interesting

investigations" as far as the means within my command will permit, for they can scarcely fail to lead to important results.

It remains to be observed, that the doctrine of the excretory powers of plants does not strictly apply to all vegetables; at least, it is manifest that trees and many shrubs will live on, and improve in, the same piece of ground for an almost indefinite period.

Many garden vegetables furnish also exceptions to the rule, and I particularly notice the potato. In fact, the experiment of M. Macaire seems to afford evidence that this vegetable does not secrete matter of any decisive character. I know those who have assured me, that potatoes have been set for ten or even twenty years on the same land, with little or no other manure than coal-ashes and the scrapings of road-sand. This sand was, in the county I allude to, obtained from the calcareous stone of the neighborhood, and it proved a powerful meliorating substance to the cold clayey soil of the district.

I venture to suggest, that grain and other crops, which expend all their vegetative energy upon the production of seed-vessels, are less likely to protrude matter from their roots than other crops which abound with large bulky foliage; they, therefore, cannot prove manure crops for their congeners, although they may render the soil unhealthy to themselves individually. With respect to the potato, I think it evident, that its foliage elaborates much vegetative matter, a large portion of which is expended in the production and support of tubers under ground. These tubers are not the roots proper, but enlarged processes, the depositories of much nutritive matter. It is highly probable, that the plants which produce bulbs, tubers, or spindle roots, whose foliage is abundant or very large, will in general be innocuous to themselves, at least comparatively so, in consequence of the absorbent powers of their bulky root processes. They will in proportion also, be of little service to corn or other crops, unless much manure be previously applied. In a word, the vast foliage which they develop, must claim a great supply of raw sap from the soil. This, or the prepared portion of it, is returned with interest to the roots; but it is then diverted into peculiar channels, and is employed in the production of those processes that constitute so large a portion of the food of man and of cattle. The bulb or tuber-bearing plants are generally but indifferent preparers of the soil for other crops, for they must exhaust its decomposable materials; but they may be grown (though not to full perfection perhaps) on the same ground without becoming diseased. Such, I think, will be found to be generally the fact; and this, as far as the experiment goes, has been confirmed by the observation of M. Macaire.

From all that has been said, it is, I think, fair to conclude that, although plants decompose and take up the nutritive matters of the soil, and render manuring indispensable, yet it is not by exhaustion that a soil is rendered unfit for a repetition of an individual crop. Facts in abundance might be multiplied, in order to prove that a rotation is called for, in consequence of the feculent matter previously deposited affecting the nutritive power of the soil in supporting any individual crop.

ON THE NECESSITY AND MEANS FOR LEGISLATIVE AID TO AGRICULTURE—NO. 3.

[Continued from page 63, Vol. II.]

For the Farmers' Register.

There is another important purpose which might be served by an experimental farm, which is almost entirely wanting in this country—the instruction of apprentices to farming. I do not mean apprentices in the common acceptance of that term—but rather pupils, who by giving their time for six or eight months, and their close attention, and manual labor, as well as time, to the business of the farm, might be taught how to perform every operation in the most perfect manner—and which are not learned, and indeed not seen, by most farmers in twenty years, if ever. It would be productive of no less honor than profit to the sons of the wealthiest farmers, who are designed to follow their fathers' business, to attend, and labor at such a school of industry: and to those who are to be farmers on a small scale, with scanty means, there would be still greater advantages, because, they would in the routine of their own business, find but little opportunity of receiving instruction in good husbandry, or of being convinced of what was bad, except by dear bought and slowly acquired experience. The business of a farmer, which requires more varied qualifications to carry on well than any other whatever, is the only one that is generally undertaken without previous instruction or training, and which, it would seem, men are expected to understand by a sort of natural instinct, (perhaps I ought to except the business of statesmen and legislators, which it appears that every man is fit for.) A young man of large landed estate, who expects to derive his entire support from that source, and to spend his life on his farm, and as a farmer, usually passes his whole minority in learning other things in no way connected with the cultivation of the soil, or in idleness—and then commences his business in the most profound ignorance of its details, and with habits altogether unsuited to proceeding either with profit or pleasure. If he has "a turn for farming and management," as we call it, and a natural fondness for the business, he may, and generally will become a good farmer, notwithstanding all these early disadvantages. Indeed, such instances of success are found in men who have lived long in towns, and who were almost entirely unacquainted with the country and with farming, during all the early part of their lives. But whatever such men have done, under their existing disadvantages, would have been much better and sooner done, and with far less waste of capital and labor, if they had enjoyed the means I have recommended for receiving instruction. To poor farmers, the value of such means for instruction, would be still greater, because their close confinement to a very limited sphere of action, in which their circumstances and habits will probably retain them throughout life, would prevent their receiving after instruction by travel, books, or conversation with the best farmers, and personal observation of their labors. To one of those men who practice farming as the agents of others, or overseers, the expense of an apprenticeship, or course of instruction at a pattern farm, would be paid back to him in his next year's wages; and his value to his employers, and as a member of the community, would be soon

doubled, unless he was incapable of being improved by instruction.

These observations bring me back to what I endeavored to establish in a preceding number, viz: that the business of the pattern farm might be (and no doubt would be) conducted with a deplorable want of economy and good management—and therefore with loss, instead of profit to the owner, and yet this be no sound objection to the use of the processes carried on, for experiment of their worth, or for the purpose of conveying instruction. If a young man desired to learn how, in the best manner, to plough land under different circumstances—to sow seed regularly—to reap wheat, and secure it well—to know the proper management of a thrashing machine, &c. &c., it would be sufficient that he should find on the pattern farm, suitable land, crops, and implements to exhibit all these operations, and the best laborers employed in executing them—and that he should join in those labors, until he had become dexterous and competent in each process. It would be utterly unimportant to the person thus acquiring instruction, whether the lessons which he received were more costly or profitable, to those at whose expense they were furnished.

Apprenticeships to farming, upon a different plan, have been resorted to with much advantage in Great Britain. Young men who were to be the possessors of good estates, have been proud to assist for months together, in the labors of such distinguished farmers as Dawson, and Walker, and Brown: and at least one of these teachers, (Dawson, who earned the honorable title of "the father of Scottish husbandry,") owed his early lights, and after success, to a like course of training on a farm in a distant region, where the state of agriculture was far more advanced than in Scotland at that time.

In these remarks on farming apprenticeships, I have referred merely to instruction in the labors of agriculture. There is another branch of instruction, the scientific or theoretical, which should not be omitted. This might be derived from a separate institution, as a professorship of scientific agriculture, or perhaps the practical and theoretical branches might be united in a manual labor school. This scheme I should be glad to hear discussed—but as I am not sanguine of success (that is, if any pecuniary profit is expected) from establishments of this kind, I leave the subject to others. R. N.

THE SKINLESS OAT.

To the Editor of the Farmers' Register.

In perusing your valuable journal, I have not been able to see mention made of what is called the "skinless oat;" can you or any of your readers inform us any thing about them? In conversing with an English farmer a few days ago on a visit to Virginia, (who presented me with a spoonfull as a curiosity) he stated that they were introduced into England in 1830 by himself; that they were indigenous of China, and succeeded remarkably well in that climate. Their product is astonishing, being twenty-six barrels of fourteen stone per acre—very hardy and standing their winters. The advantages that this grain possesses over all others of the kind, are when thrashed out perfectly free from husk, fit for immediate use, either for culinary or other purposes, their flavor being delightful, and contains more farinaceous matter than

our oats by three to one. They have produced two crops in England within twelve months; fit for the blade in three months after seeding.

He sent over to a gentleman of New York a few bushels as an experiment the last spring, and as they will show themselves this season, I shall be enabled to hear their result in a few days. If they succeed in our climate, of which I have no reason to doubt, they will be a great acquisition to the Virginia agriculturist. **BROOKVILLE.**

P. S. Since penning the above, I have received a bill of lading for one bushel sent me, which I shall leave at the apothecary store of Messrs. Grubby & Dudley for inspection, as also a package for yourself at the dry good store of Colton & Clarke, Richmond.

IRISH POTATOES AS FOOD FOR SHEEP.

For the Farmers' Register.

In conversation with a gentleman (who has travelled about a good deal) some weeks since, about managing and raising stock, &c., he told me in travelling in the western part of this state, or in Ohio, some years since, he stopped at an old Quaker's house to stay all night; and while there, he saw some one about the establishment chopping up Irish potatoes, to about the size of partridge eggs. He enquired what the chopped mass was intended for: the Quaker replied, "It is for my sheep: with chopped potatoes and a small quantity of hay, I can keep a flock of sheep fatter, and in better health, than any other way I have ever tried or seen tried."

The gentleman says he saw the flock of sheep before he left, and finer fatter looking sheep he never saw.

PHILIP.

CAUSES OF SPELT AND CHEAT IN WHEAT.

To the Editor of the Farmers' Register.

I observe in different Nos. of your Register that a considerable difference of opinion appears to exist in the minds of different correspondents with regard to the cause of spelt and cheat appearing in wheat. An experiment reported to have been made by Mr. Thomas Cocke and yourself, goes far to prove that neither spelt nor cheat is the necessary production of degenerate wheat: whilst others are as firmly of opinion that spelt and cheat are the production of, not only degenerate, but perfectly formed wheat, to which latter opinion, I myself incline, and do not think that the small grains of wheat are more apt to produce either spelt or cheat, than those which are perfectly formed and filled. In both of the instances cited by your correspondents, of spelt having been produced from wheat, the covering was either very slight or none at all; the wheat having been deposited by chance and left in the situation in which it was placed—which want of, or slowness of covering, I think was the cause of the production of the spelt from pure seed. We have not until late years heard or known much of these pests of our wheat crops, and I think the reason is obvious: our fathers were in the habit of turning hogs, horses, and cows into their wheat fields as soon as their wheat was taken off, by which means all, or by far the greater part of the wheat left after harvest, was destroyed, and none left to take root, with almost, or quite no covering, and thus produce these noxious plants. I hope it will not be understood from these remarks, that

I am an advocate for grazing our cultivated lands; for I believe very few persons are more opposed to close grazing than I am, but I see no alternative between turning our hogs on our wheat fields which are intended for fallow, and having the spelt eternally annoying us. We could put rings into the noses of these animals and thus prevent their rooting.

Another way in which I think pure wheat degenerates into spelt or cheat is, the manner in which some, if not most, of our good farmers are in the habit of getting in their wheat—which is, ploughing in the wheat after a crop of corn, and dragging after this ploughing, by which, much of the wheat is brought near or quite to the surface, and thus has not sufficient depth to prevent the wheat turning to spelt. I have known one gentleman in this neighborhood pursue the plan herein objected to with *pure unmixed* smooth-headed golden-chaff wheat (the prettiest wheat I ever saw) and the first crop produced from this seed was smartly mixed with spelt—the second had more than double what was in the first crop, and the third (the same seed having been used all three years) had, I really believe, more grains of spelt than of wheat.

I have several times observed in fields which had been in wheat the previous year and the fields not grazed, and not being cultivated the next year, a great deal of *cheat* and some *spelt*—and but in few instances (where I suppose some accident had given the seed left a deeper covering than the most of it had,) wheat the next year. Now, you know that I am a slovenly, as well as a small farmer, and I feel some backwardness in palming my own opinions upon others; but I really think it the duty of every individual to contribute his mite to the general stock of information, experience or observation, to that community of which he is a member—and hope my brother farmers will excuse what may be deemed by some, my temerity in offering to the public my plan of getting in wheat—by which, neither spelt nor cheat has ever *increased* upon me. I have always sown wheat on corn land, except one year, and ploughed it in about three or three and a half inches deep, never using the drag afterwards, which I think, would tend to expose the wheat too near the surface—though I believe that the land being fallowed first, and the wheat sown on this fallow and well dragged in, might obviate this difficulty.

The last fall I obtained my seed-wheat from two different sources: in one parcel there was some spelt: in the product of that part, there was still some. In the other, there was none that I could perceive, and in the product of that, there was not (I think) one head of spelt. In the experiment made by Mr. Cocke and yourself, the grains of wheat though extremely faulty, were deposited at a sufficient depth, and *thereby* the production of spelt or cheat avoided.*

ROBERT BATTS.

Prince George, July 2d, 1834.

* Our correspondent is mistaken as to this part of the experiment, which he refers to. The grains of wheat were placed in lines slightly traced on the hard surface, and barely covered by sprinkling a little earth over them. The covering was no where more than half an inch deep—generally less.

ON THE SUPPOSED TRANSMUTATION OF
WHEAT TO CHEAT.

For the Farmers' Register.

The statement made by a correspondent of Orange county, N. C. at page 60 of the Farmers' Register, is a very fair example of the manner in which many farmers allow themselves to be deceived. The facts were these: soon after a hill-side field had been sown with wheat, a heavy rain washed down some of the loose earth, together with some of the grain, over a strip of timothy meadow at the base of the hill; after which the grain so washed down, grew vigorously; but at harvest, nothing was seen except cheat, and the inference drawn by your correspondent is, that all the wheat turned into cheat. To me however, the chain of reasoning appears to be very defective.

In the first place he has not shown that the seed wheat contained no cheat amongst it; and positive evidence of such fact would be requisite to warrant the conclusion that he has drawn. Now unless extraordinary care and pains have been taken for that express and particular purpose, we have a right to conclude just the contrary; for what farmers commonly call clean seed wheat, has been proved in various instances, to contain from four to more than twenty grains of cheat in every handful. Assuming therefore, as we have a right to do on this occasion, that his seed wheat was not free from cheat, it follows that the whole affair can be easily and satisfactorily explained without referring to the doctrine of transmutation. It appears that the meadow was watered during the winter, which is sufficient to account for the disappearance of the wheat; and the cheat being a much hardier plant, kept the sole and undisputed possession.

He has said indeed that "every bunch [of wheat] proved to be cheat;" but I cannot suppose that he marked them; and without closer observations than are generally made in such cases, he would not be able to discriminate between the bunches of wheat and of cheat that appeared in the fall; neither would he be likely to miss the former in the spring.

He informs us that the hill-side was "rich," and this circumstance will assist in explaining why "not a single head of cheat was discovered among the wheat." Cheat though a hardier plant, is generally overshadowed and partially smothered by wheat when the latter is not winter-killed, but grows closely together; and that weed under such circumstances, not being conspicuous, is commonly overlooked, so that farmers conclude there is none in their stubbles, when there is more than enough to seed the whole ground. Cheat is a very variable plant in regard to size: I have seen it scarcely four inches high with only a solitary seed on the top, and I have seen it four feet high, with between two and three thousand seeds.

A FARMER.

Cayuga county, N. Y.

TO PREVENT THE SPROUTING OF STORE
ONIONS DURING THE WINTER.

Apply a heated iron for a few seconds to the nozzle of the onion whence the roots protruded, and it will be an effectual mode of preserving them.—*Gardener's Magazine.*

ON THE LIVE AND DEAD WEIGHTS OF CATTLE.

From the [British] Farmer's Magazine.

Sir—Having heard much in favor of a work which has recently issued from the press of the Society for Diffusing Useful Knowledge, entitled, *The Farmer's Series*, I purchased that portion of it which treats on British cattle, and on reading it I met with a statement in the first page of the ninth number, of the proportion which the dead weights of cattle, sheep, and calves, bore to their live weight, so completely at variance with every experiment I had made in my endeavors to ascertain their true proportion; and having recently conversed with so many extensive farmers and graziers, and not a few butchers, who had adopted the commonly received opinion that the dead weights were about two-thirds of the live weights of fairly fed beasts, sheep, and calves; that I am induced to lay before the public, through the medium of your valuable and widely-circulated Magazine, a short account of the live and dead weights of a few animals which were weighed either under my immediate inspection, or by persons on whose accuracy I can place implicit confidence.

In laying these experiments before the public, it is not my object or wish to cast any slur on this useful publication, from which I have derived much valuable information, and which, in my opinion, merits a place in the library of every agriculturist; but solely for the purpose of guarding my brother graziers against a disappointment which they will certainly experience, if they weigh their beasts alive before they send them to market, and estimating their dead weights by the rule laid down in this work, expect to receive a price equivalent to those estimated weights.

In the present depressed state of agriculture it is highly essential to every farmer to be able to ascertain, as nearly as possible, the weight of the animal he has to dispose of, so that he may be acquainted with its real value; and the best mode he can adopt to ascertain this is by weighing it alive, which, if an ox or cow, can be done on the machines that are attached to most of the turnpike gates, at a trifling expense. If a sheep or calf—by getting a piece of stout canvas rather more than a yard long, and about twenty inches wide, and sowing at each end a piece of strong wood about two feet in length; from the centre of each piece of wood a small rope is attached—pass the canvas round the body of the sheep or calf, and suspend it by the ropes either to a steelyard or to the arm of a scales-beam, when the weight may be easily ascertained.

I have also found Carey's Scale, which I have used for many years, to be very accurate; I have rarely found it to be 20 lbs. out in the weight of a beast, and often known it to tell within 7 or 8 lbs., and in one instance lately it gave within 5 lbs. of the weight of a heifer of twenty-eight score. As I invariably sell all the beasts, sheep, and calves, which my butcher purchases from me, by weight, and have also the opportunity of measuring those which he purchases elsewhere, and of afterwards seeing them weighed, I have had the means of trying the merits of the scale pretty largely, and can confidently assert, that if the beasts are measured with proper accuracy the scale will give within a very few pounds of the real weight.

In the statement made in the before mentioned work, they set the average gross weight of marketable beasts at 800 lbs.; whether this average be laid too high or too low is immaterial to our present object; according to their rule, the gross weight being 800 lbs., the dead weight of the carcass, after deducting the offal, will be 550 lbs., or, in the proportion of $13\frac{3}{4}$ lbs. dead, for 20 lbs. live weight. Now, I consider (and am borne out in my opinion by all the experiments I have made) that from $14\frac{1}{2}$ lbs. to $11\frac{1}{2}$ lbs. is the average proportion of fairly fed beasts, and I have no hesitation in saying, that if a lot of beasts, fed to the ordinary state of fatness, were weighed at home, (say 100 miles from London) they would scarcely average 11 lbs. dead weight there, for every 20 lbs. they weighed alive at home. I consider, taking one season of the year with another, that a fat beast of 100 stone will lose 50 lbs. in live weight for every hundred miles it travels.

We next come to sheep and lambs; these they take at an average of 78 lbs. live weight, which according to their rule, will give 50 lbs. dead, or in the proportion of $12\frac{1}{2}$ dead for 20 live weight; this is a considerably higher proportion than I have been able to obtain, those I have made being in the proportion of $11\frac{1}{2}$ to 20, as you will perceive by the annexed extracts from my books.

We will now proceed to examine their statement with respect to calves. They say a calf of 140 lbs. live weight will weigh 105 lbs. dead, or in the proportion of 15 dead to 20; in this estimate I consider them farther from the real proportion than in the beasts or sheep. I have been for some years in the habit of vealing calves, rather extensively, and have fed some as fat calves as most persons, and some which have been allowed to be the best and fattest calves ever seen in the places where they have been killed, and yet, in no instance, did any of them exceed 13 in 20. One, and only one, approached that weight, her live weight being 332, dead 214; she was twelve weeks and two days old, and was a very remarkable small calf, (a cross between the Durham and Devon breeds;) her hind quarters weighed 58 lbs. each, the loins 26, the legs 32; while her fore quarters weighed only 49. When alive, her fore quarters were considered to be fully as heavy as the hind; the difference was occasioned by the extreme size and fatness of her kidneys, which had above 10 lbs of suet on each: she was estimated by several good judges at 45 lbs. a quarter, and bets were made that she would not weigh 47; she had 23 lbs. of rough fat. You will perceive, by the statements annexed, that 12 lbs. is about the average proportion; small calves, if not very fat, will scarcely reach that proportion. In corroboration of my statements, I avail myself of an extract from a letter from Mr. Aiton, on the subject of vealing calves, which appeared in the 23d or 24th number of the *British Farmer's Magazine*, in which he mentions an extraordinary calf whose live weight was 4 cwt. 3 qrs., or 532, its dead weight 308 lbs.—rather less than 12 in 20.

You will perceive by the following accounts of the beasts which I have selected to support my statements, that they were fully fit for any market; indeed, with one or two exceptions, they were much fatter than I should wish for my own use, as the weights of their rough fat, which I have purposely given, will show, and most of them be-

ing young, they were as likely to have as little offal as any beasts that could have been selected for the purpose; several of them were either short-horns, or a cross of that breed and the Devon, and were allowed, particularly the two year old,) by all who saw them, to be the best they had ever seen of their ages.

No. 1. A three years old short-horn heifer, of my own feeding, slaughtered in May, 1830, by Mr. Warren, butcher, of Taunton; live weight 1584, dead weight 942, rough fat 116 lbs.; her dead weight was as nearly as possible 12 in 20.

No. 2. A two years old half short-horn steer, also of my own feeding, slaughtered by Mr. Warren, of Taunton, in June, 1830; live weight 1568 lbs., dead weight 924, rough fat 112 lbs.; his dead weight bore the proportion of $11\frac{1}{2}$ to 20 live.

No. 3. A three years old heifer, of my own feeding, slaughtered in 1830; live weight 1092, dead 648, rough fat 83 lbs.; her dead weight was about $11\frac{1}{2}$ to 20.

No. 4. An aged cow, slaughtered in 1832; live weight 952, dead 531, rough fat 79 lbs.; her dead weight as 11 to 20.

No. 5. A two years old Durham and Devon steer, of my own breeding and feeding, slaughtered in March, 1833, by Mr. William Dannel, of Abergavenny; live weight 1428, dead 876, rough fat 140 lbs.; his dead weight as nearly as possible 12 to 20 live.

No. 6. A two years old Durham and Devon heifer, also my own breeding and feeding, slaughtered by Mr. Dannel, of Abergavenny, 10th June, 1833; her live weight 1232, dead weight 708 lbs. rough fat 98 lbs.; her dead weight was about $11\frac{1}{2}$ to 20 live. She had been fed on the morning of the 17th of January, when she was dried, and, consequently, was fed on the morning of the 8th of June, the day on which she was weighed before being slaughtered; had she not been fed in the morning, her dead weight would have borne a higher proportion than it did.

These last two beasts were allowed by all who saw them, to be, alive and dead, the two fattest and best beasts of their age ever killed in Abergavenny.

No. 7. A small cow; live weight 630 lbs., dead 356, rough fat 55; about $11\frac{1}{2}$ dead to 20 live weight.

These being all very fat, bore a higher proportion than the average of beasts will do.

Calves, most of them bred, and all fed by me.

No. 1. Calf out of a Durham and Devon heifer, twelve weeks and five days old; live weight 335 lbs., dead 208, or about $12\frac{1}{2}$ to 20.

No. 2. Calf out of a Durham and Devon heifer, twelve weeks and two days old; live weight 332, dead 214, or about 13 to 20.

Live weight, the 5th of January, 1833, was	332
Ditto 16th of October, 1832,	86

Increase in 81 days,	246
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No. 3. Calf out of a Durham and Dutch heifer, ten weeks and five days old; live weight 302, dead 181, or about 12 to 20.

No. 4. Calf out of a two years old Durham and Devon heifer, eight weeks and five days old; live weight 242, dead 147, or about 12 to 20.

No. 5. Calf out of a two years old Durham and Devon heifer, seven weeks old; live weight 197, dead 122, or about 12½ to 20.

No. 6. Bought calf, six weeks and five days old; live weight 185, dead 103, or about 11½ to 20.

No. 7. Bull calf out of a yearling heifer, third cross of the Durham bull on Devon cow; live weight 181, dead 116, or 12½ to 20.

Live weight on the 4th of January, 1834,	181
Ditto 30th of November, 1833,	78

Increase in 35 days,	103
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This calf was forty days old, and never had any milk except his dam's, who gave more than he could take till he was five weeks old.

No. 8. Bull calf out of a Durham and Devon cow, five weeks and three days old; live weight 218 lbs. dead 135, or about 12½ to 20.

Live weight, the 4th of March, 1834,	218
Ditto 25th January, "	100

Increase in 35 days,	118
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This calf never had any milk except his dam's, who gave much more milk than he could take up to the day he was slaughtered. He was killed by Mr. Booker, of Campden, and was considered to be the best, heaviest, and fattest calf of his age ever killed there.

Sheep.

No. 1. In April, before shearing, live weight 172, dead 89; about 10½ to 20.

No. 2. In January, live weight 178, dead 97; about 11 to 20.

No. 3. In March before shearing, live weight 174, dead 91; about 10½ to 20.

No. 4. In August, live weight 162, dead 92; about 11½ to 20.

No. 5. In March, before shearing, live weight 147, dead 78; about 11 to 20.

No. 6. In March, before shearing, live weight 193, dead 99; about 10½ to 20.

Yours truly,

C. H. BOLTON.

MR. BLAMIRE'S EXTENSIVE SALE OF STOCK.

From the New Farmer's Journal.

The recent sale of stock, &c. belonging to W. Blamire, Esq. M. P., was the largest sale that ever took place in the county of Cumberland, and was also the most numerously attended. Early in the day the roads in almost all directions leading to Gaitsgill were thronged with people making towards the sale, which commenced between ten and eleven o'clock. There were, it is computed, upwards of 8000 persons present, many of them from a considerable distance. The arrangements were so well contrived, and every thing conducted with so much regularity, that not the slightest confusion took place. A ring, of about thirty yards diameter, was strongly done about with posts and double rails. Behind which, at the distance of about six feet, were two rows of planks, one a little elevated above the other, the lower about a foot from the ground, and which were densely

crowded from end to end. The space between the planks and rails was also occupied by a great number standing on the ground. A large quantity of substantial viands was prepared for the refreshment of the company, of which all might partake that were inclined. Legs of veal, hams, rounds of beef, &c. &c. disappeared in rapid succession, and in the vanquishing of which some performed prodigies of valor. Provision was made for a large attendance, but so much was the influx greater than expected that there was far from sufficient on the first day. On the second day the attendance was comparatively small, and, of course, they fared the better. The cattle were in a field adjoining, which was connected with the ring by a space strongly fenced off on each side, along which the cattle were conducted, and admitted into the ring according to the number in the catalogue. As soon as the auctioneer had knocked down one lot it was immediately driven out by an opening in the opposite side, and another brought in, so that the sale of the second was commenced almost before the other had quitted the ring. The auctioneer (M. Armstrong, to whom great credit is due for the manner in which he performed his part of the business,) was thus kept perpetually employed, and the sale went on with great rapidity. The sale, like all public auctions, was various, some lots being much dearer than others, but, upon the whole, it was considered high. The price of the fat cattle ranged from £9 to £22. Two fat Highland bullocks attracted particular attention, and were knocked down at £63. The price of the calving heifers varied from ten to twenty guineas. Lots 52, 74, and 113, none of which were very strong heifers, were sold, the first for £19 5s., the second for £21 5s., and the third for £20. The advance upon stock of all kinds could not average less than 20 per cent. Many articles which were purchased within the last few weeks were sold at an incredible advance. A number of sheep, which were purchased within a few days of the sale for 23s. 6d. sold at the auction for 33s. 6d.; and cows which were bought for about £14, sold for 20 guineas. Two fat Sutherland bullocks, which had been valued at £20 to £21 each, sold for £31 10s. each. Even the lean stock, (much of which was in very poor condition,) sold at incredible prices. There were about 300 head of cattle in all; but we understand not a few of the goods sold belonged to neighboring farmers.

NEW METHOD OF DESTROYING RATS.

M. Tenard lately read a note to the Academy of Sciences, in Paris, in which he recommends the following as a simple and effectual method of destroying rats. If there be several of their holes, begin by closing them up; those in their most frequented routs will soon be reopened, and in this way their chief resorts will be discovered. Introduce into one of the apertures, (again closing the others,) the mouth of a glass retort, and make it air tight with common luting. Sulphuret of iron is then to be introduced into the apparatus by the tubulure, and diluted sulphuric acid poured cautiously upon it. Sulphuretted hydrogen is evolved, which, entering by the hole, penetrates all the crevices into which the rats may retire, and speedily destroys them.—*Gazette Medicale.*

LOSS AND GAIN.

For the Farmers' Register.

In this communication I propose to examine a few of the disadvantages attending our present mode of making corn. The first inquiry will be, what kind of land is generally cultivated in corn, and how much it produces to the acre. In order to ascertain this, I will first arrange or class the land cultivated in corn under three heads. First, bottom or flat land; second, the best high land; and the third, old or worn out lands. I find some difficulty in saying what portion of the crop is cultivated on the different kinds of land as described; but from observation and inquiry, I will give as nearly as I can, the proportions of each. One-fifth of the land may be classed as flat—two-fifths good high land, and the other two-fifths old or worn out land. The flat usually produces from four to six barrels per acre; the best high land from two and a half to three and a half barrels the acre, and the old land from two to five bushels per acre. From this calculation, as much corn can be made with the same amount of labor upon the one as the other of the two first qualities described, the high land requiring less labor; but the last class will require as much or more labor than either of the rest, having but little, if any vegetable matter to keep the land open and light—and the corn necessarily has to be worked later, as it will not grow off as early. This statement may not be applicable to all parts of the state, but I know that it will hold good in a greater part of the tobacco growing country; that something like two-fifths of the land cultivated does not yield more than one barrel to the acre—which is not more than sufficient to feed the teams whilst employed in making the crop. Is it not a great loss to the farming interest, whilst this is the case, that something like two-fifths of the labor has been spent for nought, and worse than nothing—the horses worn out, tools and land much injured? Would it not be better to keep fewer horses, and let all such lands rest, than cultivate them on those terms? I will leave the settlement of this question to those who are in the habit of cultivating such lands, (and they are not a few) with the hope that they may do it according to the good old rule of *loss and gain* which has gone so much out of fashion these late days.

The idea which prevails in many parts of the country that so much must be cultivated, to the hand, of tobacco, wheat, corn, oats, &c., has contributed very much toward the bringing about such a state of things. Whether the land would bring any thing, or not, it must be cultivated. The overseer was not thought to be worth much unless he could cultivate and keep clear of grass 10,000 hills (or that much space) of each (which was not very difficult on much of our land.) This state of things is owing to the want of a proper application of the good old rule of loss and gain. As I have mentioned the overseers, I would recommend to many of the good farmers and planters of Virginia to work the sum by the same rule in relation to them, and see on which side of the ledger the largest sum will stand. I know that this is a difficult subject, and hard to estimate aright. In the general, the interest of the employer and overseer are opposite—more particularly where the crop is divided. The overseer

does not feel interested to attend to improvements of any kind, nor is it expected of him: his principal object is to get his reputation up as an overseer, which (in the general) can only be done by making large crops.

F.

ERROR IN PAINTING HOUSES.

Norfolk County, July 1st, 1834.

To the Editor of the Farmers' Register.

I read in a No. of your "Farmers' Register," an article showing an error in the usual manner of mixing paints, by exhibiting the fact, that the quantity of spirits of turpentine added, decomposed a relative proportion of the oil, and thereby left the white lead, or coloring matter, an useless (if not an injurious) powder on the painted surface.* From the able manner in which that piece was written, I was satisfied that the author was master of the subject, and indulged the hope that he would again resume it; but as some time has elapsed and he has failed to do so, I have thought it expedient to make a few remarks on the subject, which, may be of importance to many of your readers.

In order that the object intended in the painting of houses (whether it be the interest of the owner, by preserving the wood, or the comfort of those who inhabit them,) may be attained, it is as necessary that the paint shall be of the proper color, as it is that it shall consist of the proper materials. And if there be an error in using spirits of turpentine in paints, (which I think has been satisfactorily proven by the author of the piece above alluded to,) proof no less satisfactory can be given in support of the assertion that, there is a fundamental and almost universal error in painting the outside or roofs of houses black. That black radiates more heat, and white less than any other color, is a fact too well established to admit of doubt by those at all acquainted with the subject—and it is equally well known that black is quite pervious to the solar rays, while white is almost, if not altogether impervious to them. But should there be one among the number of those who read your work, who for want of evidence doubts the fact, he can with a lens or common sun glass, experiment to his full satisfaction, and in a few minutes remove every doubt. Let him with the glass converge the rays which fall on its surface to a focus, and place them on a piece of white cloth or a sheet of white paper, and he will perceive the paper not in the least affected by them; then let him discolor the paper and use the glass and he will find the paper almost instantly burned. And though the difference of the effects of the solar rays on the two colors may be more striking in the concentrated, than in the diffused state, yet the effect is the same as to the number of rays radiated or rejected. Black radiating more, and white less than that of other colors, it necessarily follows, that houses painted black suffer more, and those painted white less than those of any other color by change of temperature. For, a black roof, by receiving the solar rays which fall on it by day and parting with them by night, undergoes such changes of temperature as will cause the shingles with which it is covered, to expand and

* The article referred to is at page 249 of vol. I.

contract to such a degree, that parts of them on which there is no paint will be exposed to the inclemency of the weather and thereby caused to rot. Nor is this the only evil: for the paint itself suffers from the intense heat in summer; and cracks, as well as the shingles, and admits the water to assist in decomposing the wood—from all which evils white, by radiating less, is exempt. Then if the preservation of the wood is the object to be attained by painting, just so far as black is inferior to all other colors by radiating more—just so far is white superior to all other colors by radiating less. But the preservation of the wood is not the highest consideration with me in giving preference to white over black; it is the comfort of a cool room to sleep in after the fatigues of a summer's day are over, instead of an oven; for on going into an upper room of a low pitched black roof house, a sensation is experienced very similar (I think) to that which one would feel on being thrust into a baker's oven which has been partially heated. Indeed, one who has not realized it can scarcely imagine the anxious restlessness attendant on sleeping in such a room. 'Tis true one may after the labors of a summer's day are over, go early to bed—but not to sleep—he must turn and change from one side of the bed to the other, and search for a place sufficiently cool to enable him to sleep, but in vain, until a late hour, when the temperature of the room shall have cooled down in a considerable degree; then, aided by exhaustion, he falls into a deep sleep, and the room still continuing to grow colder, he becomes chilled, and wakes in the morning but little refreshed, and perhaps with pain in the head, back, and limbs, the premonitory symptoms of bilious, or ague and fever.

I have long been of opinion that many places reputed as being very sickly, owe the character which they sustain in a greater degree to the color which the houses are painted, than to any cause dependent on their local situations. And if the faculty were consulted, I believe it would be ascertained that many cases of disease which have been attributed to miasmata, had their origin in the great change of temperature to which the system was subjected during the night, produced by the great quantity of heat radiated in the day by black roofs. And many cases of disease produced by miasmata, were primarily caused by the same circumstance. The room being at bed time disagreeably warm (and the system thereby much more exposed to the attack of disease) the windows are thrown up to admit the cool air, free access is given to miasmata which enters the apartment, seizes its unguarded victim, and prostrates him on a bed of disease and suffering. If upon examination it shall be ascertained that the foregoing statements are true, it becomes an imperative duty, that all who are laboring under the evils before spoken of, should throw them off by substituting white for black in the painting of their houses: and to the farmer I would say, if it be necessary in order to preserve the wood and contribute to the health and comfort of his family that his dwelling should be painted white, it is equally necessary that his stables should be white, that his horses may have a cool place to stay in after they have done work: and if it be important that his milk and butter should be kept cool and sweet, his dairy should be white, and indeed, I do not know of a house on a farm that should not be

painted white in preference to black, as almost every thing raised on a farm, whether it be grain, hay, potatoes or any thing else, keeps better in a regular and moderately cool temperature.

I hope the time is not far distant when this subject will elicit the attention which it merits, and the learned be induced to throw the weight of their influence in the scale, that reason may preponderate, and the fickle goddess fashion in her sooty garb be compelled to retire the beam, light be restored, and the evil banished.

MATHEW.

ON THE USE OF DUTCH ASHES AS MANURE.

By Mr. JOHN MITCHELL, jr. Leith.

From the Prize Essay and transactions of the Highland Society of Scotland, for 1833.

In a short communication sent to the society some time ago, I endeavored to bring under their notice a very valuable and cheap species of manure, which, on a late tour made by me on the continent, I observed was much prized, particularly in Flanders. I then placed at the disposal of the society twenty casks (about seven tons) of the substance in question, which have been delivered free of any charge to several noblemen and gentlemen, eminent agriculturists, who will have an opportunity of trying their efficiency.

When in Flanders, I found the farmers generally complaining of the serious injury they were likely to sustain in consequence of being almost entirely deprived, from interruption of the communication with Holland, of an article which they considered essentially necessary to their domestic economy, namely, *Dutch ashes*; and as that article can be imported at a very moderate price, it is of importance to consider how far it may be proper to introduce it into this country.

In Holland, there are two kinds of turf or peats used for burning, namely, those cut as in this country from the bogs, which burn easily, but give a whitish kind of ashes, which are of little use; and another kind, more generally used, as being more durable. Having witnessed the mode of making this kind, I shall here describe it. At ditches or ponds made by cutting away the common peats, or upper parts of the bogs, men were employed in dragging from the bottom, by means of long sticks, having hooped bags at the end, the soft portion of the peat under water. They poured it out on the adjacent ground, when the water was allowed to drain off. After exposure to the air, this substance becomes in a few days sufficiently consistent to be cut into pieces of the size of a common building brick, which are dried for use. The ashes from this kind of peat are of a yellowish brown color, and are the kind so much prized in Flanders; carts go regularly round to the various houses where this turf is used, and carefully collect all that can be obtained. When the communication was open with Belgium, the ashes were sent by water to Brussels and other places in that country, and, after a long water carriage, they were often conveyed fifty, and even a hundred miles farther by land.

These ashes are used in various ways in Flanders. They are generally sown upon clover, at the rate of 25 cuvelles per hectare, equal to about 19 bushels per acre, imperial measure. They are sown on clover, wheat, and pastures, in March

and April; on oats and beans in the beginning of May; on rye in October and November. They are also used in gardens with great benefit to the crops, by being scattered over the surface, after the land is sown and raked. They are also good for hops, a handful being given to each plant. When applied to grain, they promote its early growth; but are principally useful in increasing the quantity. They are generally sown by the hand like grain, but care must be taken to leave no part of the surface without its just proportion.

In Holland, the mode of applying them is as follows: In March, the wheat is worked with the hoe between the rows, and sown with clover, and in May, the rows of wheat are weeded. The wheat being reaped, and as soon as the danger of floods is past in the spring, the land is harrowed, and thereafter they strew about 20 imperial bushels on the acre of clover. This practice is greatly recommended, and found to be highly advantageous.

An eminent Dutch agriculturist, F. L. W. Brakkel, in a work lately published by him at Utrecht, points out the advantages of using Dutch ashes on the clover in this way, his alternation of crops being potatoes, rape-seed, peas, wheat, clover and oats. Another writer on agriculture, J. R. Schwarz, says the ashes must be used in their dry state, and thinly strewed, and on ploughed land must be harrowed in before or at the sowing. They are of most use on cold wet grass lands to dry the ground, destroy the acidity, and kill the mosses. They are so much persuaded in Belgium of the great use of Dutch ashes, that the farmers have the following proverb: "He who buys ashes for clover, pays nothing; but he who neglects doing so, pays a double price." The great advantages to be derived from this practice are also pointed out by Sir John Sinclair, in his tour in Flanders; and many other testimonies might be adduced in its favor.

By an analysis made by Professor Brande of the Royal Institution, the contents of the specimen given him were:

Siliceous earth,	-	-	-	-	32
Sulphate of lime,	-	-	-	-	12
Sulphate and muriate of soda,	-	-	-	-	6
Carbonate of lime,	-	-	-	-	40
Oxide of iron,	-	-	-	-	3
Impurities and loss,	-	-	-	-	7
					100

The great advantages which the Dutch ashes hold out to the farmer are, their being a cheaper and (at least for some purposes) more certain and beneficial manure, than any now in use. They can be easily transported to a great distance, they give a greater number of bushels to the ton than bones or rape-cake, and they are only about half the price per ton of either. It has also to be remarked, that bones are getting scarce abroad, and are rising in price. Besides, the Dutch ashes require no previous expense, or preparation in this country, but can be immediately applied after being landed; whereas, bones and rape-cake have to undergo the process of grinding, before they are fit for use.

As a top dressing, these ashes are superior to common manure, it having been found, on making comparative trials in Flanders, that the crops of

clover, where the ashes were used, were much earlier, heavier, and superior in every respect to those which had undergone a top-dressing of horse and cow dung. As a top-dressing to the second crop of clover, they will be found highly advantageous, as by being used this way, they wonderfully increase the rapidity of growth and produce. One of the best proofs of their usefulness is the fact, that while we have frequently in this country very backward and light crops of clover and grass, in Flanders, where this top-dressing is used, such a defection seldom if ever occurs. They are therefore likely to be of great use to the farmer on the lands which have "grown sick of clover;" and the importance of having a good crop of clover is the more obvious, when it is considered that, in general, the succeeding crop of wheat is only good when the preceding crop of clover has been so.

Besides fertilizing the land, the ashes may be of great advantage in preventing the injuries arising from worms or insects; and will no doubt be highly useful as a top-dressing, if regularly persevered in for a certain time, in destroying the mosses and lichens so apt to injure the lawns and natural pasture in this country.

I have found a bushel of these ashes to be about forty pounds in weight. The ton therefore, consists of about fifty-six bushels. At £3 per ton, which will be the price from the shop, free of every charge, the expense of manuring an acre will only be about £1—[or \$4 80.]

BREAD MACHINERY.

Mr. Cawderoy has patented the undermentioned improvements in machinery to be used in the process of manufacturing bread and biscuits.

This patentee has devoted his attention to every part of the process of bread manufacture; he commences the operation by causing the flour to pass through a sieve, by means of a cylindrical brush, in very minute quantities, and with much uniformity. From this sieve, the flour descends into a mixing vessel, with an inclined bottom. The liquid to be mixed with the flour, to constitute the sponge, is admitted from a reservoir through a pipe near the bottom of the mixing vessel, and the quantity admitted during the process is adjusted to the quantity of flour passed through the sieve, by means of a stop-cock. On the inclined bottom of this vessel, a series of vertical rods, constituting a kind of rake, is made by means of a crank, to move forwards and backwards on the inclined bottom, in a direction at right angles to the inclination; and the apparatus is so arranged, that the quantity of inclination may be varied at pleasure, to suit different qualities of the bread intended, or of the materials employed in its manufacture. The greater the inclination, of course the quicker will the mixture pass off from the rake into the second mixing vessel, placed a little lower than the first, to receive it. This vessel, which has its bottom horizontal, is likewise furnished with a traversing rake, to mix the ingredients still more intimately. The sponge is afterwards returned into the mixing vessels, to have an additional supply of materials to complete the dough, the usual time being allowed for it to rise and fall, to prepare it for separation into loaves and the operation of baking. The dough is next transferred to a press-

ing vessel, through an aperture at the bottom of which it is forced by means of a piston, into a long trough, where it is separated into loaves, by means of a frame furnished with projections of the size of the intended loaves. The frame descends till the dividing partitions cut half through the dough in the trough. The dough is then turned by means of the trough frame, in which it is held swinging on two pivots, and the dividing frame is brought down again to complete the separation of the loaves.

The loaves are then conveyed into an oven on a stage mounted on rollers, and furnished with an endless band of cloth, or other suitable material, by the motion of which they are delivered in succession from the stage upon the oven floor; and when the baking is completed, this stage, with its endless band, is forced into the oven under the loaves, and brings them all out at one time. And thus will be obtained a much greater uniformity of baking than can be effected by the usual method of filling and emptying the oven.—*Trans. Soc. Arts.*

AGRICULTURE IN BAVARIA—ITS IMPROVEMENT BY THE POLICY OF GOVERNMENT.

From the British Farmer's Magazine.

Bavarian agriculture, previously to the first French revolution, was, according to all accounts, less advanced than that of any other state in Germany, and, indeed, remained stationary for ages. By far the greater part of the land in cultivation was the property of the religious establishments; and the capital, Munich, was, as the German name (*Munchin*) implies, the city of monks. When, however, the estates of the religious establishments were sold, they were chiefly divided into lots so small, that almost every individual who was head of a family became a purchaser. These purchases were made at very low prices, on long credits; and a very great number of them, perhaps the greater number, were agreed to be paid for by the occupant in a terminable annuity; that is, he paid a fixed rent for a certain number of years, after which the land became his own freehold. The laborers who had thus suddenly become proprietors, had, for the most part previously cultivated the same lands for the religious establishments, and, therefore, the external change was, at first, hardly apparent. Every estate, however, abounding in timber and stone for building, and a great part of the country being on a basis of limestone rock, or limestone gravel, facilities were readily afforded for a laborer to enlarge his cottage, and to add to it the necessary agricultural buildings. Scarcely any outlay was required from him but labor, and, as the produce was entirely for his own benefit and for that of his family, his exertions were extraordinary. By degrees, cottage-dwellings, of a somewhat improved description, and small farm-houses and farmeries, appeared in those parts of the country where the soil was richest; not, however, detached, as in Britain, but chiefly congregated together in small villages. The system of culture did not, at first, improve as a system; but, the common operations of the established practice being more carefully performed, better crops were produced. Ultimately, however, the system became improved, in consequence of the operation of the national education that was established when

the monasteries were put down, and by the teaching of agriculture and gardening, both by books and examples, in these schools. One of the first consequences was an improved rotation of crops. Almost the whole of the details of agricultural improvement in Bavaria have originated with M. Hazzi, an agricultural writer, and editor of an agricultural journal in Munich. The activity and patriotic benevolence of this gentleman are beyond all praise. It was chiefly through his exertions that a piece of ground was added to every parochial school in Bavaria, to be cultivated by the scholars in their leisure hours, under the direction of the master. In these schools, Hazzi's catechism of gardening, of agriculture, of domestic economy and cookery, of forest culture, of orchard culture, and others, all small 12mo vols., with woodcuts; sold at about 4d. each, are taught to all the boys, and those of gardening, the management of silkworms, and domestic economy, to the girls. Since these schools have come into action, an entirely new generation of cultivators has arisen; and the consequence is, that agriculture in Bavaria, and especially what may be called cottage agriculture and economy, is, as far as we are able to judge, carried to a higher degree of perfection than it is any where else in the central states of Germany; at all events, we can affirm that we never saw finer crops of drilled Swedish and common turnips, or finer surfaces of young clovers, than we observed along the road sides in October and November, 1828. The fences, also, were generally in perfect order, and a degree of neatness appeared about the cottages which is far from common either in France or Germany. These remarks are not the result of observations made, as is frequently the case, from the cabriolet of a public diligence, but from deliberate inspection, and from entering many of the cottages and schools. To enable us to do this, we travelled, every where in Germany, in a private carriage, and never in the dark. We had also, as we have before stated, the advantage, while in Munich, of constant intercourse with M. Hazzi, M. Skell, and other members of the agricultural society; with the chief engineer, Baader, who had been many years in Scotland; with Baron Eichthal, the proprietor of a large estate, on which he has introduced the Scotch husbandry, and with whom we were acquainted in London; and, with his very intelligent tenant, an east Lothian farmer. The result of the whole of the information procured, and of the observations made, is, that we think the inhabitants of Bavaria promise soon to be, if they are not already, among the happiest people in Germany. The climate of the country will prevent its agriculture and gardening from advancing beyond a certain point, but to that point both will very soon be carried.

So desirous is the government of improving not only the agriculture, but even the face of the country, that they have a standing commission, consisting of counsellors, engineers, architects, and the landscape gardener Skell, solely for the purpose of devising improvements in the direction of public roads, canals, bridges, public buildings, and gardens, national forests, but, above all, for lining the public roads with trees. These trees are, in some places, in the suburbs of towns, chiefly ornamental; in others they are fruit trees, or mulberry trees cultivated for the silkworm, (a catechism on the management of which is also published by M.

Hazzi;) and, where nothing more profitable or ornamental will grow, forest trees. An extraordinary degree of attention is paid to the mile-stones and to the guide-posts, neither of which are wanting on any road. The guide-posts are generally painted black, with the letters in white or red, the black contrasting better with the snow, which, in some parts of the country, covers the ground for six months in every year. Some of the mile-stones have a bench of stone, forming a plinth or base around them, as a seat; others, where stone is not so plentiful, have a semi-circular area of turf around them, bounded by a bench of the same material, as a seat, and planted behind with poplars or other trees. The neatness with which these turf benches, and the ditches or other fences, and also the grass margins by the sides of the roads, are kept, far surpasses any thing of the kind which we have ever seen in Britain. With us, if any thing of this kind is met with in the public roads, it is chiefly the result of accident, either in the situation or circumstances of the road; or arises from the appointment of a road surveyor who happens to have at once some taste, and more than ordinary facilities for displaying it. In Bavaria the whole is the result of design and system, the entire management of the roads being in the hands of the government. The same ought certainly to be the case in this country; for, otherwise, it is utterly impossible to adopt one general system of improvement.—*Weekly Dispatch.*

PRICES OF IMPROVED SHORT-HORN CATTLE IN ENGLAND.

From the British Farmer's Magazine.

At the Rev. H. Berry's fourth sale of improved short-horns, on the 11th February, 1834, the following prices were obtained:

Lot 1.	2 years old, . . .	£24 3 0
2.	Ditto, . . .	36 15 0
3.	Ditto. Bought in. £45 bid,	
4.	3 years. Ditto. Ditto.	
5.	3 years, . . .	29 18 0
6.	Calf, sold with the above.	
7.	3 years, . . .	30 9 0
8.	3 years, . . .	38 17 0
9.	8 years, . . .	32 12 0
10.	9 years, . . .	26 5 0
11.	Heifer calf, . . .	15 15 0
12.	10 years, . . .	36 15 0
13.	10 years, . . .	48 6 0
14.	2 years old bull, . . .	39 18 0
15.	1 year old ditto, . . .	45 3 0
16.	Bull calf, . . .	15 15 0
17.	Ditto, . . .	31 10 0
18.	Ditto, 9 weeks old, . . .	32 11 0

NEW PLANTS.

Baron Hagal, the Austrian botanist, who lately visited the Neilgherry Hills, in India, declares that the unknown varieties of trees and shrubs, existing there alone, exceed 10,000. The wild rose runs up to the top of the highest trees, and grows to the thickness of four or five inches.—A delicious specimen of orange but not exceeding a filbert in size, is also found there. In the orange valley below Kotagherry, about 4500 feet above the level of the sea, numerous fruit trees are found, amongst which are the wild fig and lemon tree, the latter bearing fruit little inferior in size and flavor to that of Spain.

ON THE CULTURE OF CLOVER.

From the Albany Cultivator.

Few things have contributed more largely to the modern improvement of husbandry, than the introduction of clover in connexion with the rotation of crops. This plant serves to ameliorate and fertilize the soil, and at the same time it affords an abundance of wholesome food for every description of farm stock. Whether cut for winter stores, for soiling in the yard, or fed off by stock, but few crops surpass it in the quantity of cattle food which it affords. Although cultivated in Holland and Flanders from an early period, with great advantage, it was not introduced into Great Britain till the 16th century. At present, clovers enter largely into the succession of crops there, on all soils, and in every productive course of management. They are principally instrumental in giving to Flanders its high celebrity as an agricultural country, greatly in advance, in improvement, of the states around it. The clover system has converted some of the poorest districts in England, into the most productive and profitable. In the United States it is comparatively of recent introduction; and even at this day its benefits are but partially appreciated or applied as they ought to be. In connexion with gypsum, clover first became a subject of notice and culture in the counties about Philadelphia, and in the county of Dutchess, some forty years ago; and we are much indebted to the example and writings of Chancellor Livingston, Judge Peters, and other gentlemen of learning, wealth and enterprise, for the improvement and wealth which it has conferred on our land. Many of our farmers have yet much to learn, before they can realize the full benefits which it is capable of affording in the profits of the farm. Although botanists enumerate nearly fifty species of the clover family, our present remarks are intended to apply merely to the common red kind (*trifolium pratense*.)

There are three faults in the management of clover which we design briefly to notice in reference to alternate husbandry. Two of these are:

1. *Too little seed is usually sown.* The object of the clover crop is to procure a cheap food for animals and plants. Few if any crops surpass it in the quantity which it affords of these—and few exhaust the fertility of the soil less. One farmer sows four to six pounds of seed to the acre, and gets in return a thin but coarse crop of hay or pasture. Another sows ten to fourteen pounds, obtains double the burthen of the first, and at a trifling extra expense of less than a dollar to the acre for seed, while his land is doubly benefited by the green crop to be ploughed in. From ten to fourteen pounds of seed should be sown to the acre, whether the object is to benefit the stock or the land. The product will be somewhat in the ratio of the seed sown; and the advantages of heavy stocking both in the hay and to the soil, will far outbalance the cost of the extra seed.

2. *Clover lays are permitted to remain too long before they are brought under the plough.* The common clover is a biennial, or at most a triennial plant; and if not ploughed under before the third year, its advantages to the soil, as a green crop are mostly, or wholly lost; while after the second year it adds very little to the crop of hay. But if turned under the first or second year, it furnishes to the soil a great quantity of vegetable mat-

ter, the true food of plants. It not only serves as a manure, but it benefits mechanically. Its tap roots penetrate and divide the soil, and as they decay render it friable, and permeable to heat, air, and moisture. A well set clover lay imparts to the soil as much benefit, in our opinion, as ten loads of yard manure to the acre. When a broadcast crop is to be followed by a tillage crop, as corn, potatoes, or small grain, there is manifestly a decided advantage in stocking it with clover, though it is to be turned under the ensuing fall or spring. We estimate its value as manure, to say nothing of the pasture which it affords, at from five to ten dollars per acre, while the cost of the seed does not ordinarily exceed one dollar. I have sown rye and clover, upon a piece of poor sandy land, for which I had no manure to spare, three years in succession with manifest advantage.

LOSS OF WEIGHT IN COOKING ANIMAL FOOD.

It is well known that, in whatever way the flesh of animals is prepared for food, a considerable diminution takes place in its weight. As it is a subject both useful and curious in domestic economy, we shall give the results of a set of experiments, which were actually made in a public establishment: they were not undertaken from mere curiosity, but to serve a purpose of practical utility. 28 pieces of beef, weighing 280 lbs., lost in boiling 73 lbs. 14 oz. Hence the loss of beef in boiling was about 20½ lbs. in 100 lbs.: 19 pieces of beef, weighing 190 lbs., lost in roasting 61 lbs. 2 oz. The weight of beef lost in roasting appears to be 32 lbs. per hundred lbs. 9 pieces of beef, weighing 90 lbs., lost in baking 27 lbs. Weight lost by beef in baking is 30 lbs. per 100 lbs. 27 legs of mutton, weighing 260 lbs. lost in boiling, and by having the shank-bones taken off, 62 lbs. 4 oz. The shank-bones were estimated at 4 oz. each, therefore the loss in boiling was 55 lbs. 8 oz. The loss of weight in boiling legs of mutton is 21 lbs. per 100 lbs. 35 shoulders of mutton, weighing 350 lbs., lost in roasting 109 lbs. 10 oz. The loss of weight of mutton in roasting was 31½ lbs. per 100 lbs. 16 loins of mutton, weighing 141 lbs., lost in roasting 49 lbs. 14 oz. Hence loins of mutton lose by roasting about 35½ lbs. per 100 lbs. 10 necks of mutton, weighing 100 lbs., lost in roasting 32 lbs. 6 oz. From the foregoing statement, two practical inferences may be drawn. 1st. In respect of economy, it is more profitable to boil meat than to roast it. 2nd. Whether we roast or boil meat, it loses by cooking from one-third to one-fifth of its whole weight.—*Philosophical Magazine.*

CONJUGAL AFFECTION OF A SHARK.

From the Journal of a West India Proprietor. By the late Matthew G. Lewis.

'As I am particularly fond of proofs of conjugal attachment between animals (in the human species they are so universal that I set no store by them,) an instance of that kind which the captain related to me this morning gave me great pleasure. While lying in Black River harbor, Jamaica, two sharks were frequently seen playing about the ship; at length the female was killed, and the desolation of the male was excessive:—

"Che faro senz' Eurydice?"

What he did *without* her remains a secret, but

what he did *with* her was clear enough; for scarce was the breath out of his Eurydice's body when he stuck his teeth in her, and began to eat her up with all possible expedition. Even the sailors felt their sensibility excited by so peculiar a mark of posthumous attachment; and to enable him to perform this melancholy duty the more easily, they offered to be his carvers, lowered their boat, and proceeded to chop his better half in pieces with their hatchets; while the widower opened his jaws as wide as possible, and gulped down pounds upon pounds of the dear departed as fast as they were thrown to him, with the greatest delight and all the avidity imaginable. I make no doubt that all the while he was eating, he was thoroughly persuaded that every morsel which went into his stomach would make its way to his heart directly! "She was perfectly consistent," he said to himself; "she was excellent through life, and really she's extremely good now she's dead!"

WILD ANIMALS OF THE ILLINOIS, NORTH AMERICA.

Abridged from the Illinois Monthly Magazine.

The buffaloe has entirely left us. Before the country was settled, our immense prairies afforded pasturage to large herds of this animal, and the traces of them are still remaining, in the "buffaloe paths" which are to be seen in several parts of the state. These are well beaten tracks, leading generally from the prairies in the interior of the state, to the margins of the large rivers; showing the course of their migrations, as they changed their pastures periodically, from the low marshy alluvion, to the dry upland plains. In the heat of summer they would be driven from the latter by prairie flies; in the autumn they would be expelled from the former by the mosquitoes; in the spring the grass of the plains would afford abundant pasturage, while the herds could enjoy the warmth of the sun, and snuff the breeze that sweeps so freely over them; in the winter the rich cane of the river banks, which is an evergreen, would furnish food, while the low grounds, thickly covered with brush and forest, would afford protection from the bleak winds. I know few subjects more interesting than the migration of wild animals, connecting, as it does, the singular displays of brute instinct, with a wonderful exhibition of the various supplies which nature has provided for the support of animal life, under an endless variety of circumstances. These paths are narrow, and remarkably direct, showing that the animals travelled in single file through the woods, and pursued the most direct course to their places of destination.

Deer are more abundant than at the first settlement of the country. They increase, to a certain extent, with the population. The reason of this appears to be, that they find protection in the neighborhood of man, from the beasts of prey that assail them in the wilderness, and from whose attacks their young, particularly, can with difficulty escape. They suffer most from the wolves, who hunt in packs like hounds, and who seldom give up the chase until a deer is taken. We have often sat, on a moonlight summer night, at the door of a log cabin on one of our prairies, and heard the wolves in full chase of a deer, yelling very nearly in the same manner as a pack of hounds. Sometimes the cry would be heard at a

great distance over the plain; then it would die away, and again be distinguished at a nearer point, and in another direction—now the full cry would burst upon us from a neighboring thicket, and we could almost hear the sobs of the exhausted deer; and again it would be borne away and lost in distance. We have passed nearly whole nights in listening to such sounds; and once we saw a deer dash through the yard, and immediately passed the door at which we sat, followed by his audacious pursuers, who were but a few yards in his rear.

Immense numbers of deer are killed every year by our hunters, who take them for their hams and skins alone, throwing away the rest of the carcass. Venison hams and hides are important articles of export. The former are purchased from the hunters at 25 cents a pair, the latter at 20 cents a pound. In our villages we purchase, for our tables, the saddle of venison, with the hams attached, for 37½ cents, which would be something like one cent a pound.

The *Elk* has disappeared. A few have been seen in late years, and some taken; but it is not known that any remain at this time within the limits of the state.

The *bear* is seldom seen. This animal inhabits those parts of the country that are thickly wooded, and delights particularly in cane brakes, where it feeds in the winter on the tender shoots of the young cane. The meat is tender, and finely flavored, and is esteemed a great delicacy.

Wolves are very numerous in every part of the state. There are two kinds; the common, or black wolf, and the prairie wolf. The former is a large, fierce animal, and very destructive to sheep, pigs, calves, poultry, and even young colts. They hunt in large packs, and after using every stratagem to circumvent their prey, attack it with remarkable ferocity. Like the Indian, they always endeavor to surprise their victim, and strike the mortal blow without exposing themselves to danger. They seldom attack man, except when asleep, or wounded. The largest animals, when wounded, entangled, or otherwise disabled, become their prey, but in general they only attack such as are incapable of resistance. They have been known to lie in wait upon the bank of a stream which the buffaloes were in the habit of crossing, and when one of those unwieldy animals was so unfortunate as to sink in the mire, spring suddenly upon it, and worry it to death, while thus disabled from resistance. Their most common prey is the deer, which they hunt regularly; but all defenceless animals are alike acceptable to their ravenous appetites. When tempted by hunger, they approach the farm houses in the night, and snatch their prey from under the very eye of the farmer; and when the latter is absent with his dogs, the wolf is sometimes seen by the females lurking about in mid-day, as if aware of the unprotected state of the family. Our heroic females have sometimes shot them under such circumstances.

The smell of burning assafoetida has a remarkable effect upon this animal. If a fire be made in the woods, and a portion of this drug thrown into it, so as to saturate the atmosphere with the odor, the wolves, if any are within reach of the scent, immediately assemble around, howling in the most mournful manner; and such is the remarkable fascination under which they seem to labor that

they will often suffer themselves to be shot down, rather than quit the spot.

Of the very few instances of their attacking human beings, of which we have heard, the following may serve to give some idea of their habits. In very early times, a negro man was passing in the night, in the lower part of Kentucky, from one settlement to another. The distance was several miles, and the country over which he travelled entirely unsettled. In the morning his carcass was found, entirely stripped of flesh. Near it lay his axe, covered with blood, and all around the bushes were beaten down, the ground trodden, and the number of foot tracks so great, as to show that the unfortunate victim had fought long and manfully. On pursuing his track, it appeared that the wolves had pursued him for a considerable distance, he had often turned upon them and driven them back. Several times they had attacked him, and been repelled, as appeared by the blood and tracks. He had killed some of them before the final onset, and in the last conflict had destroyed several. His axe was his only weapon.

The *prairie wolf* is a smaller species, which takes its name from its habit of residing entirely upon the open plains. Even when hunted with dogs, it will make circuit after circuit round the prairie, carefully avoiding the forest, or only dashing into it occasionally, when hard pressed, and then returning to the plain. In size and appearance this animal is midway between the wolf and the fox, and in color it resembles the latter, being of a very light red. It preys upon poultry, rabbits, young pigs, calves, &c. The most friendly relations subsist between this animal and the common wolf, and they constantly hunt in packs together. Nothing is more common than to see a large black wolf in company with several prairie wolves. I am well satisfied that the latter is the jackall of Asia.

Several years ago an agricultural society, which was established at the seat of government, offered a large premium to the person who should kill the greatest number of wolves in one year. The legislature, at the same time, offered a bounty for each wolf-scalp that should be taken. The consequence was, that the expenditure for wolf-scalps became so great, as to render it necessary to repeal the law. These animals, although still numerous, and troublesome to the farmer, are greatly decreased in number, and are no longer dangerous to man. We know of no instances, in late years, of a human being having been attacked by them.

We have the *fox*, in some places in great numbers; though, generally speaking, I think the animal is scarce. It will, undoubtedly, increase with the population.

The *panther* and *wild-cat* are found in our forests. Our open country is not, however, well suited to their shy habits, and they are less frequently seen than in some of the neighboring states.

The *beaver* and *otter* were once numerous, but are now seldom seen, except on our frontiers.

The *gopher** is, as we suppose, a nondescript.

* The writer of this interesting article, appears not to be aware that the *Gopher* has already been described. It belongs to the class Mammalia, order Rodentia. It was formerly included in the genus *Mus*, of Linnæus, but Rafinesque has given the elegant name of "*Geomys*." It is the "*Pseudostoma*" of Say, and the *Mus Bursarius* of Shaw. There is but one

The name does not occur in books of natural history, nor do we find any animal of a corresponding description. The only account that we have seen of it is in "Long's Second Expedition." In a residence in this state of eleven years, we have never seen one, nor have we ever conversed with a person who has seen one—we mean, who has seen one near enough to examine it, and to be certain that it was not something else. That such an animal exists is doubtless, but they are very shy, and their numbers small. They burrow in the earth, and are supposed to throw up those hillocks which are seen in such vast abundance over our prairies. This is to some extent a mistake, for we know that many of these little mounds are thrown up by craw-fish, and by ants.

The *polecat* is very destructive to our poultry.

The *raccoon* and *opossum* are very numerous, and extremely troublesome to the farmer, as they not only attack his poultry, but plunder his corn-fields. They are hunted by boys, and large numbers of them destroyed. The skins of the raccoons pay well for the trouble of taking them, as the fur is in demand.

Rabbits are very abundant, and in some places extremely destructive to the young orchards, and garden vegetables.

We have the *large grey squirrel*, and the ground squirrel.

There are no *rats*, except along the large rivers, where they have landed from the boats.—*Featherstonhaugh's Journal*.

ON THE FOREIGN CORN TRADE.

By MR. ISAAC DIMSDALE, London, Editor of the Universal Corn Reporter.

In giving an account of how the corn trade is conducted in different parts of the world, a considerable detail must necessarily be introduced. I shall begin by stating the mode in which foreign corn is obtained.

As the celebrated report of Mr. Jacob is always quoted on this subject as the "highest known authority," I shall probably be deemed presumptuous in expressing my opinion that his report is in many instances *very erroneous*, and I account for it in this way. The letters of introduction, &c. which a gentleman going out on a special mission from the British government would take with him, would be addressed to men of the *highest rank and station*, who, from this very circumstance, could not be supposed to possess a correct knowledge of the details of trade; for if, in this enlightened country, where a nobleman and a merchant are so nearly on a footing in society, it is frequently amusing to witness the singular ignorance displayed by *large landed proprietors* of the corn trade, what must be the case in countries where civilization has not reached to nearly the same height? How could these people in high rank abroad give Mr. Jacob the requisite information? But I attribute the incorrectness of Mr. Jacob's report principally

to his ignorance of the German language, the acquisition of which must be indispensably necessary to obtain correct information. People are very jealous of *writing down* aught by which they might commit themselves; but in colloquial intercourse round the table or elsewhere, the most useful hints are occasionally thrown out, where often "more is meant than meets the ear." Mr. Jacob's not possessing a knowledge of the German language lost him many valuable opportunities of improving the advantages which, to a certain extent, he undoubtedly possessed in a pre-eminent degree.

As *Danzig Königsberg, Elbing*, in fact, *Poland* generally, exports more wheat than any other part of the continent, a short statement of how the trade is carried on at these ports, may serve as a guide to the foreign trade generally. And, in the first place, it may not be improper to mention the mode of cultivation practised in *Volhynia*, one of the principal districts for supplying those markets, and from whence the finest wheat comes.

The population consists entirely of slaves, and either the proprietor farms his own estate, or lets it to what are called "Possessors," at the rate of so much per day's labor, calculated for the peasant; thus the proprietor receives so many day's labor, or rather he receives so much money for each day's labor of the slave. There is a greater number of days' labor imposed on some than others. Suppose there are 1000 slaves on the estate, a calculation is made out of that number how many days' labor they are to perform during the year for the proprietor. A census is then taken of each person and family, which is put into the hands of the "possessor," who exacts so many days' labor from the peasantry, and thus pays so much per day's labor as the rent of his farm to the landlord.

This rotation of crops is followed; 1st, wheat; 2d, wheat and rye; then barley and oats; and after that the ground lies fallow. The capabilities of the soil are most extraordinary; and some idea may be formed of the number of acres under cultivation, when I state that from Riga alone the following quantities of grain constitute only one year's exportation: wheat, 200,000 quarters; rye, 1,350,000 quarters; barley, 75,000 quarters; oats, 101,000 quarters; and from 20,000 to 25,000 tons of flax, besides the vast quantity of corn which is eaten by vermin, wasted by exposure in stacks, and destroyed for want of a demand. It is no longer, then, a matter of surprise that corn can be produced at so exceedingly low a rate in Poland, Russia, &c.

It was stated in evidence by John H. Lander, Esq. before the House of Lords in 1827, that wheat had been selling in Volhynia at 7s. and 8s. per quarter; but that the proprietors of land would be *well satisfied* if they could obtain 12s. per quarter upon their estates! What do the advocates of free-trade say to this? unless, indeed, they wish to drive all our land out of cultivation to benefit the foreigner.

Taking, then, the maximum price of 12s. per quarter as our guide, we shall see what the wheat will cost, brought to and landed in London via Danzig. The Prussian and Polish landlord employs a broker to dispose of his wheat at Danzig, for delivery the following spring, generally considered "the 15th of May" in the wording of corn-contracts on the continent; but, of course, this depends on the breaking up of the ice, or, as it is

species yet known, the *Geomys Bursarius* or *Earth Rat with Pouches*. It is the size of a rat, of a reddish grey color, has deep cheek pouches, which open externally, enlarging the sides of the head and neck. When it was first figured in the Transactions of the Linnæan Society, and in Shaw, vol. 2, part 1; these pouches were represented turned inside out, as though it had been a bag on each side of the head.

termed, "first open water." From the territory of *Volhynia*, the wheat is conveyed down the River *Bug*, which joins the *Vistula*, and thus reaches *Danzig*. The expense of this transport, owing to the great distance, is from 9s. to 14s. 6d. per quarter, making the cost when warehoused in *Danzig* 26s. 6d. per quarter, or, to use the words of a Polish proprietor, "If I could always reckon on obtaining 26s. per quarter for my wheat delivered at *Danzig*, I and my neighbors would be perfectly satisfied." The merchant who buys the wheat, either stores it on speculation,—sells it at a certain price, free on board a vessel,—or ships it on consignment to a corn-factor in London, or any other port where he imagines it can be sold to the best account. The expense of freight and insurance varies according to the season of the year, scarcity of vessels, and other causes. At present the rate is only 3s. 6d. per quarter, with 10 per cent. "primage" or gratuity to the master, frequently designated "hat money," and the insurance is 15s. per cent. On arriving in London, the cargo is entered "in bond," unless intended for immediate sale, when the duty is forthwith paid, and the cargo sold and delivered to the buyers direct from the vessel.

If landed, an expense of 7d. per quarter for lighterage is incurred, and about 8d. per quarter city-dues for metering the corn; this work being performed by sworn officers, appointed by the corporation, and who alone can measure grain out of any vessel arriving in the port of London. Several attempts have been made to do away with this monopoly, but ineffectually. It is certainly an improper state of things, that a man may not employ his own workmen to take his own corn out of his own vessel; but such is the case in London, and in London only, I am happy to say.

When the wheat is landed, the granary rent immediately commences at the rate of 5s. per 100 quarters per week. "Turning and screening," should the corn lie long and require it, are 7s. per 100 quarters; and there is, lastly, an expense of about 4d. per quarter again paid to the corporation for re-metering the corn out of granary. The expenses of sale in Mark Lane are 1s. per quarter, and 1 per cent. for guaranteeing the debt, which all London corn-factors do, they never acting in the capacity of brokers. The credit given is one month, consequently the net proceeds are due in cash one month from the date of sale; but the foreigner generally re-imburses himself by drawing a bill at two or three months' date, when he hands the bill of lading of the wheat for about two-thirds of the probable net proceeds, and the balance is either remitted, or a bill at sight drawn by the shipper for the same.

A good deal of corn is changed against ducats; the ducats are, in general, coined in Holland. The bankers in Hamburg and the bankers in London do the business on joint account; they send those ducats to *Danzig* and *Konigsberg*, and against them they get bills upon London, sometimes at two or three per cent., sometimes at one per cent., and through that medium they thus get a market for their bills. The people in Poland generally take gold or ducats; these ducats are in general new Dutch ones, and they go there at a particular value, about twenty-eight guilders.

The next principal market for grain to *Danzig*, as regards an export trade to England, is *Hamburg*, that being a considerable depot for the corn grown

on the banks of the *Elbe* and neighboring territories. When a sufficient price can be given, barley is sometimes sent to *Hamburg* from *Bohemia*, in which province some of the finest quality is grown; indeed, it is fit for malting purposes, and always commands a preference in the London market. To the agricultural reader, it may not be uninteresting to learn how tillage is conducted in those districts which are at a comparatively short distance from us.

Instead of a plough in the Duchy of *Mecklenburg* (to which I shall principally confine myself) an instrument called "hacke" is usually applied. It is merely a broad coulter, somewhat curved at the bottom; hence the tearing up of the soil is not called ploughing but "hacking." In fallowing, the land is hacked four times; namely, in autumn, in June, in July, and the fourth time in September or October. The first hacking is called the stubble furrow; the second, the fallow furrow; the third, the turn furrow; and the fourth, the seed furrow. For barley, which follows after the winter corn, the ground is furrowed three times, viz. in autumn the winter furrow, in April the turning furrow, and in May the seed furrow. For the oats, which follow after barley, the land is hacked twice, first in autumn, called the turn furrow, and the second in May, called the seed furrow. Peas, when sown in the first course after the winter's corn, are furrowed twice; when sown in the second course three times. Beans are not much cultivated; the soil, qualified for their growth, not being abundant in that country. Rape requires five courses, or one time more than wheat and rye. The harrow is applied each time after the tearing up of the soil with the hacke. A good soil is usually harrowed, first with an iron-tined, and afterwards with a wooden-tined harrow. With the latter the land is generally cross-harrowed, that is to say, in an oblique way, on patches of ground of about two rods in width. The rollers are particularly applied in the turn furrow (April) for crushing the clods. Some agriculturists use also the roller after sowing for the purpose of making the soft soil either more solid, or crushing the clods on the strong lands. Others prefer to have the clods that are found in the seed furrows broken by the hands of laborers. On the lands which are neither too loose, nor liable to form into clods, the roller is not generally applied.

A laborer can mow and bind in a day, of wheat $1\frac{2}{3}$ acre; of rye $1\frac{1}{3}$ acre; of barley $1\frac{1}{3}$ acre; of oats $1\frac{2}{3}$ acre. However, the space of land which can be mown in a day, by one laborer, depends very much on the strength of the corn itself; and the expense of mowing ought, on that ground, to be calculated rather in the proportion of the quantity of produce than the extent of surface. The binding is generally done by women, the shocking by men. The rye is usually bound together behind the scythe; the female binder following immediately after the mower, a method which is not practised with the other sorts of grain. On some estates, this mode of binding the rye, close behind the scythe, has been done away with.

The value of 100,000 *Mecklenburg* roods, equal to $536\frac{3}{4}$ acres of land, of medium soil, with suitable buildings, and sufficient wood belonging to it, is £4082 9 0 sterling. An estate of 1834 acres has recently been sold for 82,000 dollars, or £13,960 sterling, which is in equal ratio to the above valua-

tion. The taxes on this estate amounted to £13 19 10 sterling. On an estate of 1152 acres, I have been furnished with the following particulars of taxation, which may be deemed interesting:—

1. Church-rates, clergymen, repairing the minister's house, and conveyance of materials, - - - - -	£9 18 2
2. Insurance of the building implements and live stock against fire, also insurance of the crops against hail, - - -	17 1 9
3. Repairs of bridges, roads, ditches, and canals, - - - - -	3 8 6
4. Support of the poor, - - - - -	7 13 5
5. School tax, about - - - - -	7 13 2
	£45 15 0

The extent of estates varies from 320 to 2350 acres. Such estates are managed in one farming establishment; but there are others of a still larger extent, arising from the annexation of smaller estates to the principal ones.

There is a novel kind of association established, called the "Board of Hypothecation," where each estate has its hypothecation book deposited. In this book all the mortgages with which the estate is encumbered, are inscribed. This system has the effect of giving a full and clear view of the state of incumbrances on the estates. Besides this institution, a *credit verein* (credit association) has been formed, to which a considerable part of the proprietors of the estates of Mecklenburg belong. The estates which thus belong to this association, are mutual guarantees for half the amount of the taxed valuation, when that sum is borrowed upon their security. The directors of this association issue transferable bonds, bearing 4 per cent. interest, but the landholders pay $\frac{1}{2}$ per cent. more, or $\frac{1}{4}$ per cent., from which the expense of administration is defrayed, and the remainder is applied towards forming a reserve fund.

Wheat can be produced at 25s. per quarter, on an average of late years. I say *of late*, because from the year 1796 to 1808, wheat often sold *there* at 9s. per bushel, and even more! The expense of receiving wheat into store at Hamburg is 9d. per quarter, and the granary rent, so long as it remains there in warehouse, is 2d. per quarter per month. The expenses of freight and insurance are in general about half those from Danzig; sometimes even less. When the traders (who sail at stated periods *full or not*) cannot get a cargo, I have known the freight as low as 1s. per quarter. The other charges are precisely the same as those already enumerated.

Of late years a considerable trade has been carried on with *Odessa*; but the immense distance will always militate against a very large importation direct from thence. Much business has, however, been done by means of shipping to Malta, Gibraltar, &c. taking out and cooling the cargo, if requisite, and then reshipping it for England.—As some may not know the meaning of "cooling," it is necessary to state, that many cargoes have been so heated on the voyage, as to render the pick-axe necessary to get the wheat out of the ship's hold and in several instances the whole has been thrown overboard by permission of the Board of Customs, or burnt for manure, as it would have endangered the safety of the warehouses, from the intense heat which it engenders; for, even spread-

ing out heated corn on a floor three or four inches thick will not cool it. Independently of the length of voyage from *Odessa*, there is another circumstance attending the trade there, which forms a considerable impediment to it, namely, that the money must be advanced to the growers before harvest, or they will not send it down to *Odessa*, the expense being so heavy, and the confidence in that country so little; but I believe the merchant is mostly the sufferer, as the farmers frequently pocket the money, and never send the wheat.

I should mention, that a good deal of wheat is shipped from *Odessa* to *Malta*, where it is landed and stored in the *Rock*, and then hermetically sealed, the advantages of which are these, that any worm in the wheat rises to the top and dies; and if the wheat is put into the *Rock* in good condition, whenever it is removed the condition will be equally sound, and the expense of keeping it is only one per cent. per annum. In case of any demand arising, the wheat is within a reasonable distance, and can be forthwith shipped off, which is of course a great convenience to the owners.

Having thus given a summary statement of how foreign corn is cultivated and sent to England, it may not be uninteresting to many to know a little more of the details of the trade. And, in the *first* place, to describe how grain is brought from the interior to the shipping ports. In Russia, Prussia, Germany, Poland, &c. where the estates lie contiguous to rivers, the corn is sent down them in flat-bottomed barks or barges; but the navigation is frequently very dangerous, and at all times precarious. In winter, the rivers are subject to great inundations on the breaking up of the ice; and in summer they are sometimes quite unnavigable for want of water. These causes, preventing supplies from coming to market, occasionally produce a considerable advance in the prices. The river *Dnieper* has many cataracts and shallows, so that barks can pass for a very short period only in the spring, and those only of a small size. Consequently most of the corn that goes to *Odessa* is sent in carts, carrying about 5 quarters each. These carts are drawn by oxen, and they travel in parties of 100 to 150. The oxen are pastured during the night, and they take advantage of the time when the peasantry are not occupied with the harvest; so that the proprietors can send their wheat 300 or 400 miles at a very trifling charge. *These districts might be cultivated to almost any extent, should an increased demand for grain arise, and the soil is what is termed "virgin land," requiring no manure whatever.* The wheat is generally dried in the sun at *Odessa*, before shipment, which is a far preferable mode of drying, in respect to that grain, to kiln-drying; but, as I have before mentioned, even this will not entirely preserve it from heating, for I never knew a cargo to arrive direct from thence without sustaining more or less injury on the voyage, which is the reason why the Mediterranean ports are made depots for *Odessa* wheat. From the Baltic ports corn is generally shipped from May 15th to the end of October, and sometimes later.

As respects quality, the finest wheat in the world is grown in *Volhynia*, and shipped from *Danzig*, *Elbing*, or *Konigsberg*. The peculiarity of this wheat is the little bran it yields, which makes it much sought after by the English (but more especially by the London) millers. It possesses, like-

wise, a surprising degree of whiteness, and yields more *farina* than any other sort of wheat, not excepting the finest Essex or Kentish. This superior description is denominated "fine high mixed;" almost all the Danzig wheat coming *mixed*, in proportion to the quantity of *red* wheat, so much lower are the quality and value of the article. The general proportion of ordinary runs is one-third white to two-thirds red. The different denominations are, "finest high mixed;" "good and fine mixed;" "ditto, adapted for Scotland and north of England;" "red mixed," and "ordinary and light;" the first weighing from 61 lbs. to 63 lbs. per bushel, and the latter 56 lbs. to 57 lbs. per bushel. The difference in price varies from 10s. to 15s. per quarter.

In the Mediterranean, there is some very fine white wheat grown, both "soft" and "hard." A considerable importation took place from Genoa, Naples, &c. a year or two since, which was freely purchased by our millers, at high prices; but this description of grain is principally used for making *macaroni* in Italy and France, and is not exported unless a better price can be obtained for it elsewhere, which is not generally the case.

The most inferior wheat comes from *Riga*. It is extremely small berried, of a dingy red color, and full of little black seeds. There is, however, some of better quality, but the generality is of an inferior description, and the price obtained for it is proportionally low, being 10s. and 15s. per quarter, under the finest *Danzig*.

There is occasionally an import of wheat from *Canada*, the *United States*, &c.; but the supply principally comes to Liverpool, and in the shape of flour, of which a very large quantity annually arrives. The duty on wheat from the British colonies is only 5s. per quarter, and on flour 3s. 6d. per cwt.

During the present year, I had a consignment of wheat from Van Dieman's Land, the quality of which was very superior, as may be supposed, when I readily obtained 8s. per bushel for it. I should, however, remark, that a portion of it which was sown on one of the finest farms in Bedfordshire, would not grow; and I am informed, that scarcely any wheat was ever known to vegetate in this country that had crossed the line, unless particular care be taken to preserve it from the effects of the atmosphere.

The best red wheat comes from *Stettin*, *Rostock*, *Wismar*, &c. This grain is very like English wheat, and when it arrives in good condition, is much esteemed, especially when we are visited with a "dripping harvest," it being then almost indispensably necessary to mix with our new corn, in order to render it fit for grinding.

The finest barley comes from *Bohemia*, *Silesia*, and the banks of the *Saale*, by which river it is transported to the *Elbe*, and thence to *Hamburg*. This barley will frequently malt as well as English; but nearly all other continental descriptions are only fit for grinding, being mostly of very light indifferent quality. The greatest quantity is grown on the *Danish* islands; but there is a good deal shipped from *Danzig* and *Konigsberg*. Its value at present in those ports is 12s. 6d. to 14s. per quarter.

Beans are not cultivated to a great extent; but from *Denmark* a tolerable quantity is annually exported, the quality being pretty good. They are

generally of the harrow-tuck description; but sometimes "Heligoland" or small pigeon are exported, which obtain high prices. The *Egyptian* beans are of a very peculiar red color, occasioned by the intense heat to which they are exposed when ripening, in addition to which they generally become very heated on the voyage, insomuch that whole cargoes have been totally destroyed. They were formerly an article of great speculation; but the consumption of beans has much decreased of late, in consequence of the comparative cheapness of oats; so that very few are now imported direct from *Egypt*, but occasionally some come from *Leghorn*, *Marseilles*, &c. where there are magazines of them, as of *Odessa* wheat. Their value in those places is at present 16s. per quarter.

Although we were originally indebted to *Prussia*, it is supposed, for our best stock of blue peas, the cultivation of them is not now carried to any great extent, but we occasionally get from thence some fine white boiling peas. Their present value is about 21s. or 20s. per quarter, free on board.

Rye is grown to a very great extent in *Poland*, principally for home consumption; but there is likewise a considerable export trade, chiefly to *Newcastle*, where a large quantity is annually used, the quality being generally very fair.—present shipping price, 20s. to 22s. per quarter.

Buckwheat, or brank, is grown to some extent in *East Friesland*, *Denmark*, &c. and was formerly much esteemed here for distilling purposes; but *barley* has latterly been so extremely low in price, that the distillers have preferred purchasing this grain on the spot, to incurring the risk of a voyage in importing *buckwheat*. This grain may now be purchased at *Hamburg* at 16s. 6d. to 20s. per quarter.

Tares are shipped in quantities from the *Danish* islands, where they can be produced at a very reasonable rate, say 15s. to 17s. per quarter.

The finest heavy Poland and potato oats are grown in *East Friesland* and *Holland*. What are termed the "*Dutch Brew*," oats seldom weigh less than 41 lbs. to 42 lbs. per bushel, and often much heavier. The *Archangel* oats are of quite a different description, being extremely thin skinned, sharp, long, and of a bright yellow color. Post and coach masters are very partial to this corn, as it has little husk. *Riga* and *Petersburg* oats are somewhat similar, but they do not generally weigh so heavy as the *Archangel*, neither are they so bright. The cause of this brilliant yellow color, is the intense heat of the weather during harvest. In France is grown a peculiar grey-colored oat; but generally much corn is not exported from that country, as they consume their own growth. Occasionally, however, great quantities have been sent over, for I never yet knew foreigners refuse to ship corn to this country, if they could only obtain a good price for it. They will live on husks or any thing, and part with nearly all their grain; but only for a consideration. *John Bull*, on the contrary, will have a belly full of the good things of this life; at any rate he goes upon short allowance with a very bad grace.

The manufacture of oil cakes is carried on to a great extent in *Germany*, *Flanders*, *France*, and *Holland*, from whence the English graziers and farmers are principally supplied; indeed, occasionally, the English crushers import foreign cakes, and re-press them through their own mills, extract-

ing a considerable portion of oil therefrom; and then they form them into a "town made shape," and sell them as "home manufactured," which, in point of fact, they really are.

To conclude this outline of the manner in which corn is produced abroad and shipped to this country, it remains only to remark, that all the principal shippers of corn in the Baltic are also ship owners; consequently they keep their vessels employed in transporting grain, seeds, or oil cakes, which they do at a more moderate freight than an English captain will engage for. But so much more esteemed are an English master and his vessel, that frequently more freight is paid them by the merchant here in preference to shipping in a foreign bottom. The Englishman will frequently make the voyage in half the time that a foreigner can, and sometimes even arrive before, or as soon, as the bill of lading, and thus save the expense of insurance, which, from the distant ports, is frequently very heavy. If I made a choice, I should always prefer Scotch captains; they are generally shrewd, pushing fellows, and I need not say how much dependence may not be placed on an active, honest, and clever master of a vessel to go a long voyage to a distant port, where the purchaser of a cargo is at the mercy of a man many miles distant, who, as he takes care to get paid for the corn before it arrives, is not always very particular as to its quality.

I believe I have now touched on all the topics likely to interest the general reader, but before concluding, I will take the opportunity of redeeming from disgrace a most useful part of the community, I mean "*the speculators in foreign corn*," who are too frequently held up to public odium. In Sweden, Prussia, Spain, Denmark, &c. magazines or storehouses of grain are obliged to be erected in different places, in order to guard against bad seasons. In Spain alone, there are upwards of 5000 of those depositories (denominated "*positas*.") Every occupier of land is obliged to bring a certain quantity of corn, proportionate to the extent of his farm; the following year he takes back the corn he has thus deposited; and replenishes the empty garner with a larger quantity, and thus he continues annually to increase the stock by these contributions, called "*censos*," till a certain measure of grain is deposited; then every one receives back the whole corn which he has furnished, and replaces it by an equal quantity of new corn. Whenever a scarcity happens, these repositories are opened, and the corn dealt out to the people at a moderate price.

In some places, seed corn is distributed to necessitous husbandmen, who are bound to restore as much in lieu of it the next harvest. The institution of such a system as this, is no doubt highly necessary in a country only in an imperfect state of civilization; but that which requires the authority of government to accomplish abroad, is in England brought about by less questionable means. The commercial and enterprising genius and spirit of our countrymen, induce them to enter into speculative purchases, and risk the investment of their capital in grain at one period, with a chance of reaping a profit during the deficient season that may succeed, and thus the supplies of a good season and a bad one, are in a great measure equalized to the consumers. In the ruder states of society speculators in corn are the objects

of popular hatred, when, in fact, they are amongst the most serviceable members of the community; but for their operations, the people must either incur the chances of famine, or the clumsy machinery of government be resorted to. In offering these remarks, I do it solely from a sense of justice, as I myself do not belong to this class of individuals.

THE FIRE-SIDE REFLECTIONS OF A HUCKINGHAM FARMER, ON AGRICULTURE.

From the Virginia Farmer.

Our ancestors came to this country to acquire good lands and realize independent fortunes—to obtain the first object was easy, but the attainment of the second, required activity and labor. Extensive and unreclaimed forests, a virgin soil of great fertility and a congenial climate, admonished our forefathers, that the cultivation of tobacco would be profitable. Land being abundant and cheap, it was not to be expected, that an enlightened system of agriculture would prevail, and but little effort was made to improve or preserve the fertility of the soil. To clear the forests, make tobacco, so long as the land would produce the article, then plant corn, plough it up hill and down, and in a few years convert the field into a common, was, in short, the practice of our ancestors. When land could, as then, be purchased for a trifle, they perhaps did not act very unwisely. Men of intelligence and wealth entrusted the management of their estates to overseers, and those in middle life, instead of superintending their own farms, obeyed the dictates of vanity and they too employed overseers. Thus to a great extent, the land and labor of the country, were under the control and supervision of a class, (I do not mean all, as there are honorable exceptions) who were then, and are now, as ignorant and self-conceited, as they are avaricious and obstinate. Each succeeding generation, unmindful of the fact, that population was increasing and that land would necessarily appreciate in value, reverencing the habits and usages of the previous one, pertinaciously adhering to the same system, and deriving no instruction from the improvements of other countries or the sad experience of past times, has persisted in this plan of exterminating the forest and devastating one of the fairest portions of the civilized world. Now that our farms scathed with gullies and studded with pine thickets, and presenting other indications of poverty, our citizens becoming dissatisfied with the state, because they cannot go on to make tobacco, corn, and wheat as heretofore—are lasting evidences of the impropriety of our management—the almost entire change in the aspect of our land and situation, in connexion with the great importance of an alteration in the mode of conducting our agricultural affairs, calls for mature reflection. The system, that at one time might have been profitable and called for by the situation of the country, inasmuch as the land was mostly in woods and selling for a mere trifle, may be ruinous under a different state of circumstances. Whether our situation in an agricultural point of view, and the objects to which our attention should be called, are not materially different from what they might justly be considered some time back, I shall leave to others more fully to discuss, but that this is a critical and important crisis to the planters and farmers generally, and those whose

interests are intimately connected with and must participate in their good or bad condition, is so apparent, that I think few will be disposed to question the assertion, much less to attempt its refutation.

The present depressed condition of the state is attributed to a variety of causes, by different persons. One will charge it to the tariff—one to the banks—another to the want of roads and canals—a fourth to tobacco-making—and a fifth to slavery—but very few will own, (I know none that have) that they are or have been, amongst the many causes, or even connected therewith. It is almost always ascribed to something, or some one else. That all these causes have had more or less effect, I shall not attempt to disprove, but as it is more easy generally to give a theory than to prove one to be incorrect, I shall content myself by stating my views on the subject, which are as follows: Is it not much more reasonable to attribute by far the greater part of our grievances and misfortunes, to our own bad management in reference to agricultural matters, and to the fact that men of talents and wealth are, and have been, too much disposed to exchange the simplicity and "*otium cum dignitate*" of the farmer, for the intrigues of office and the allurements of political distinction; as well as to the custom of estimating their wealth more by the quantity of land and number of slaves, than by the fertility of the one, or the profitable employment of the other? We all know that the lower class in society, are the higher—let the latter be negligent, luxurious, and reckless—giving to a third or fourth person to do, what they should personally attend to—manifest an aversion to engage actively in agricultural pursuits—leave their farms and domestic concerns, in the hands of ignorant agents, with every inducement to conduct business entirely with a view to present profit, regardless of future consequences—and it would require no great length of time for the same spirit to pervade society generally—and the consequence would be, that the same state of things would be induced, as we have at present. But suppose a different course to be pursued by the better informed and more wealthy people, and that they had not suffered themselves to be idle spectators, on the one hand, or aspiring politicians on the other. (I mean in the general)—and, that they had acted the part of good stewards over the commonwealth, and have taken as much interest in teaching by example in the field and with the plough share, as on the floor of legislation. Would it be an overstrained deduction, to infer, in that case, that the condition of the state, would be the very reverse of what it is at this time—probably with a high degree of agricultural improvement, we would have been enabled to have retained our population, increased our wealth and standing in the union, and by our thrifty condition attracting talents from one quarter, and wealth from another, Virginia might have been spared the reflection, much more the mortification of being jeered about her declension from the high stand she once occupied in this republic. Of one fact there can be but little doubt, that with all the advantages in the world we need never calculate on succeeding well, without good management, economy, and personal attention to business, and this is equally as true when applied to farming, as to other concerns of life—but with these latter re-

quisites in conjunction with our other advantages, we can achieve wonders, and combat successfully, a host of opposing elements. I know some farmers who go to the bank for money—some who supply their families in foreign goods—others far removed from improved roads and canals—and others who own many slaves and make tobacco—all have been and are improving their estates, and accumulating wealth by judicious management and wise economy, as fast as most prudent men need wish, notwithstanding all these drawbacks.

In giving my views, however, I do not intend to assume, that the opinions of others are wrong, and my own only, true—it is enough for me to indulge in a little speculation, ending in the conviction that whether the disease has been ascribed to the proper causes or not, that one fact is undoubtedly true, that our country is far from being in a prosperous condition. With this conviction, I am not very solicitous to know the causes which produced this decline—while the evil is apparent and demands a prompt and efficient remedy. Individuals can, by a combination of efforts, applied to different pursuits, all more or less converging to one grand object, do much towards relieving the state from its difficulties. That system which, in addition to individual wealth and happiness, will equally promote national prosperity, without legislative interference, eminently deserves a thorough consideration—and the more especially when the fact is so notorious that the people prefer a plain and cheap government, and one that will interfere as little as possible, in the control and regulation of their labor.

An observing eye, in glancing over the state; though it may see much to criticise and to deplore—yet must perceive, that in our agricultural operations, a revolution has commenced and is progressing, which if vigorously prosecuted for a few years, will materially improve its appearance. Taking this for granted, may we not expect, that with the aid of our talented men, a judicious development of our physical advantages, and a proper application of our domestic energies, we would be able yet to obtain that high degree of perfection, in an agricultural point of view to which our climate and soil entitle us. A great poet remarks, that "there is a tide in the affairs of men which when taken at the flood leads on to fortune," and now that the current is changing, it is much to be hoped that Virginians generally, would redouble their efforts, and by their conduct proclaim, that if the "Old Dominion does not overcome her embarrassments and stand first among the foremost, that she shall go down with colors nailed to the mast." Let us only come to the determination, and by our acts evince our desire to carry on an agricultural reform. Let us, by holding out inducements, endeavor to attract public attention to the subject. Let the farmers, convince their sons, that honor and wealth can be as successfully obtained in agricultural pursuits, as in either of the learned professions. Let the farmers read and profit by the experience of other countries and other times—let them have their clubs or societies and *agricultural papers*, and who would be so skeptical as not to be convinced with all these assurances, that our march would be onward?

As I have indulged in the flattering assertion,

that a change in our farming business, is taking place for the better, it may not be amiss to cite some of the evidences upon which I ground my belief—several of which I will now briefly mention. A farmer and planter in our vicinity who conducts business on a very large scale, is now setting us in the management of his farms, a useful and valuable example, and so far as he is concerned, it is highly profitable; while it gives full scope to an industry and sagacity, of which but few can boast. Strangers would be astonished at his rapid progress annually, in improving his farms, by manuring largely, clovering and plastering, in connexion with skillful management, while at the same time, very large crops are made.

He has given a practical illustration of the fact, that an extensive and judicious system of improvement, is by no means incompatible with great annual profits; and that the expense and labor of improving is amply repaid by the additional productiveness and increased value of the land. Another neighbor is devoting a portion of his time and capital to raising the most improved breeds of cows and sheep—and I dare say, that no one who has seen his stock can think them unworthy of the attention either of the proprietor, or of the public. The introduction of such animals will be highly advantageous to our section of the state, as well as creditable to the liberality and enterprise of the intelligent and worthy gentleman, under whose auspices they were introduced. A third gentleman has been for several years past, enjoying all the luxuries which a spacious garden, containing a very great number and variety of the most choice fruits and vegetables, selected from all quarters of the union can afford. It is true, his garden could not be compared either with a green-house establishment, exhibiting splendid trifles, and foreign plants of every latitude, fantastically arranged to please the eye or regale the senses, or with Prince's noted collection, but it is such an establishment as would be a valuable appendage to any farm, indicating at the same time, the good sense and taste of the proprietor. Such persons as those above alluded to, combine the "utile et dulce," or to give it a farmer's version, they can *work and talk too*. They have done, and will do more towards advancing our permanent interests, than a small host of pseudo-politicians; and the public countenance should make it manifest, that such evidences of good management and laudable enterprise, though they may not elicit songs of praise, yet that they are viewed with great satisfaction. I have heard many very good planters say, they had rather improve a piece of tolerable land, than clear the same quantity even for tobacco. Now this, a few years ago, would have been thought rather singular, but it seems we are now finding out, that it costs about the same labor to make good land first-rate, that it does to prepare the like quantity for cultivation. This I consider a great point gained. Our cultivation is better than when I could first recollect—we have less surface work, less ploughing up and down hills—but we are deficient in many things yet—that is about the depth of turning lands—the propriety of breaking all lands deep—the advantages of coulters, and the best time and method of preparing lands for different crops—also, the most judicious method of making manure—whether it would not answer as well to use most

articles as manures previous to their undergoing partial decomposition in the farm pens, and whether a top dressing, or the usual way of using manures, is most advantageous? The plan of having farms divided into from four to five fields, and a more frequent rotation of crops, seems to be more generally pursued. A rotation of crops, I have no doubt, could be carried to a much greater extent, and with greater profit, than most persons are willing to believe. Many instances have been recorded, of fields being cultivated in various crops in quick succession, and of their rapidly improving. Our farmers would do well to investigate this subject. Probably almost as much depends on a quick and varied succession of crops, as on skillful cultivation or manuring. To ascertain in our climate and soil, what crops succeed best after each other, is not unworthy of notice, as we have all seen more or less of its effects, and it may not be unreasonable to suppose, that some crops would be to their successors almost as a coat of manure, by the superior condition in which they leave the ground for their propagation. The propriety of cultivating less land, and of having that good, is, I think, daily gaining ground, and in fact most of us appear for a long time, to have thought, that to make crops, a great deal of land must be cultivated, even if it was rich, but if poor, then an enormous quantity. We seemed to have lost sight of our reason, and to look only at the land and the crop we wished to get, without taking into consideration the labor and the best plan of applying that to produce what we wanted. Most persons are willing to admit, that a small crop well worked, is better than a large one half worked, or that one acre of rich land will produce as much as two of common. Now would it not be best in good land to lessen the crop, and to spend a part of the labor which would be used in the cultivation of two acres of poor land; and make one rich, and then get the crop? Suppose, for example, you take fields instead of acres—say a farm with four fields, sub-divided into eight—say you improve one of these small fields every year; in eight years your farm would be rich—then you could go on to double and treble what you formerly made.

It is true, in the commencement, these things will be on a small scale, but every year they are gaining, and this annual addition will increase so rapidly, that before many years have past by, a person's means of improving will comparatively speaking, be almost without limit. We all remember a sum in arithmetic, about a smith's undertaking to shoe a horse, for the first nail, a certain price was to be given, and for every other nail the price was to be doubled, and the prodigious sum it amounted to. Apply this to a judicious method of improvement, and I dare say, it will not be very deceptive; if the result would not be so great, it would at least be most astonishing. The great barrier, which prevents most persons from readily giving into this plan, is their not having matters so arranged, as to be able, with tolerable convenience, to make a commencement. This it is true, will at first require some additional labor, and a little extra expense—but is it not most wise at this particular juncture, in the management of our affairs, to take a prospective view and conduct them accordingly, and lay aside for a season our great eagerness for present profits—the more especially as it is very questionable whether

our ideas about present profits are not based more in imagination, originating from the distorted medium through which we view the improving system, than upon the facts which some farmers are illustrating, or the logical deductions of distinguished agriculturists? Would not some of our farmers, who have many laborers, and a large quantity of poor land, do better to subtract a part of the former from their usual plantation employments, and have them engaged in improving their farms? That some capital at all times can be profitably employed in improving, but few will dispute, and we all know that a great deal of labor is yearly expended without any thing like an adequate profit, on account of our lands being poor—and it is equally well known, that labor is as cheap here, if not cheaper, than in most of the states—and it is also equally as plain, that if our lands were rich and productive, that this state would be the first choice of most persons, much less Virginians—and that our lands would sell as high as any in the union.

Now with all these facts before us, does it not appear as clear as midday, that this is the most suitable time to alter our operations—and that improvements can be made here at as little cost, and with as much expectation of profit, as any where in the union? Is it not as praiseworthy and as profitable to convert barren wastes into verdant fields, as to fell the lofty forest, and to expose its virgin soil to rude cultivation for a few years—then to neglect, and finally to ruin? That man is considered more deserving who makes a fortune, than he who squanders one—if this is true in money matters, it is much more so when applied to agriculture. A man who enriches sterile fields, and causes them to yield abundant crops, in doing so adds materially to the general stock of wealth, more, in my opinion, than one who hoards up money—but the one who ruins a piece of land, does a public injury, and is much more to be reprehended, than the spendthrift who spends his fortune—because in the latter case, the money only changes hands, whereas in the former, the soil passes away, and no one is benefited by the change.

Agriculture can be made to flourish either by directly aiding and patronizing it—(and as a consequence, manufactures, commerce, &c. would follow in its wake) or indirectly by making internal communications, building up cities and manufacturing establishments. But does it not appear most reasonable to have the materials in possession, or in other words to have produced the crops before we determine whether they shall be sent to market on such and such rail road or canal—or go to subsist this or that manufacturing community or commercial city? The other has the semblance at least of accomplishing the thing backwards, and this is plain, because agriculture is usually considered the great pivot upon which commerce and manufactures turn, and without it, they could not exist but to a very limited extent, inasmuch as their other resources are only secondary—therefore it being the most important, ought to be the first subject to call our attention. But circumstanced as we are, it may be best all things considered, to effect the object by combining the indirect with the direct means—in that event, we could certainly calculate on accomplishing our views, and that too, in the shortest period. It can

be aided directly, by getting up societies for that purpose, and this I think would be a very efficient mode, and the more particularly as it is the order of the day to do most things either by societies or conventions. It could be aided most powerfully by our intelligent and wealthy men—let them study the subject, as it is practised to the north, and in Europe, and by skillful men of this state—let them make experiments, introduce the different improvements in utensils, cultivation, seed, stock, &c., and last, though not least, let them inform the public of the results of experiments—of the various articles introduced into the state—and of all of the new lights which time, practice, and information, under the guidance of strong heads and penetrating judgements may develop.

A plaster inspection has been essayed by our legislature, but unfortunately did not succeed. If the legislature could be convinced of the amount the farmers lose on that account, and of the great necessity of doing every thing in its power to foster a spirit of improvement, as well as of availing itself of every opportunity of strengthening public confidence both in the means used and the end thereby to be obtained—it could hardly be doubted but that inspections would be provided. Any of our practical and intelligent gentlemen would confer a favor on no inconsiderable portion of the farming community, by taking up the subject, stating its effect and importance, and urging the legislature to give it a more mature consideration.*

In concluding these reflections, allow me to say, that I have not the vanity to believe, that they will have much, if any effect, upon the minds of others. Great would be my gratification, if any thing I have said should induce older and abler men, to attempt the reformation of those abuses in our system of agriculture, which talent, energy, and perseverance combined, will infallibly accomplish. Let our intelligent and distinguished citizens light the torch and lead the way, and who will doubt the issue—who will doubt but that the substantial yeomanry of our state will follow? Let them by precept and example, give a tone to public opinion, awaken the attention and call into exercise the dormant powers of a people who possess the elements requisite to constitute a prosperous and powerful commonwealth. Let them endeavor to rescue an agricultural life from the odium which tavern politicians and "small-beer" lawyers have long been casting upon it, and convince young Virginians, that agricultural pursuits are conducive to health and virtue, and are not irreconcilable with expansion of mind, liberality of sentiment, or devoted patriotism.

E. W. H.

December 10th, 1834.

*We differ with most persons as to the policy and effects of legal inspections in general—and have additional objections to the particular inspection recommended above. Unless the inspector possessed and exercised some chemical knowledge, (which could not be expected, from the usual manner of filling such appointments, and the rate of payment for the service,) his decisions as to the purity of gypsum, would be of very little worth.—*Ed. Farm. Reg.*

MONTHLY COMMERCIAL REPORT.

To the Editor of the Farmers' Register.

The month of July has been to the farmers a fortunate one—a favorable harvest was succeeded by peculiar circumstances, which enables those farmers who have facilities in getting their wheat to market early, to obtain higher prices than they anticipated. The first contracts made were at \$1 15 per bushel, but a spirit of competition was excited among the millers, and particularly those whose new establishments are on an enormous scale, which without any circumstances to warrant it, caused the price to be run up to \$1 25 and even \$1 30. The farmers wisely availed themselves of this excitement which continued but for a few days, and during that short period most of the crops on or near James River and its tributary streams were sold, or rather contracted for, deliverable at early periods. It is estimated that the extent of these operations exceeded half a million of bushels. But so soon as the millers tired of playing this losing game on each other, the price declined to \$1 10 for red, and \$1 15 for white wheat, which rates are now current. It is to be desired that this enterprising spirit may not result in loss to the millers, so that it may be cherished hereafter. Some cargoes of new wheat which arrived at New York, were sold there at \$1 16 while \$1 25 was paid in Richmond.

The capacity of the mills in Richmond, and its immediate vicinity, is adequate to the manufacturing of about 500,000 barrels of flour per annum, if it were practicable to keep them supplied with grain. The best markets for their flour are in South America, but only a moderate portion of so large a quantity can be required in those markets. As the season advances the price of wheat will probably decline, unless some European demand shall arise.

With the progress of the inspections the impression that the tobacco crop will prove deficient, continues to gain ground, and the prices of such qualities as are suitable for shipment are well sustained. The lowest grade sells at \$3 75 to \$4 per 100 lbs.—good, fine and choice descriptions at \$8 to 12, 13 and 14. Foreign capitalists are believed to be largely interested in purchases of this article, as well as of cotton during the present year. They may thus exercise a controlling influence on the prices abroad, so long as the supply does not greatly exceed the demand—but when the article has passed out of their hands, their efforts will be directed to reduce its value, that they may renew their speculations, which have thus far this year been successful.

The cotton manufacturers in England and France have done a larger and more profitable business this year than heretofore, and while supplies from this country have increased, those from other sources are smaller than usual—prices have therefore been well supported. The manufacturing establishments in Virginia have, on the contrary, been very unprofitable this year, and those in the northern states have suffered under the same influence. The business in cotton may be considered closed for the season. The last sales were at 12½ to 13½ cents. The prospects for this and all other growing crops are reported to be favorable.

A change in the relative value of gold and silver to which the attention of congress had been re-

peatedly called for many years, has at length been enacted.

The pound sterling of Great Britain has been and is called par at \$4 44. The gold sovereign of one pound sterling, was by our former standard worth \$4 57; by the new regulation it is worth \$4 84.6. This change will have the effect of increasing the value of bills on England, because if a bill for £1000 sterling could be purchased here for \$4444, or even for \$4500, an importation of 1000 sovereigns might be therewith made, which would be worth here \$4846, and leave a good profit after paying interest, brokerage, and insurance. The importation of silver into this country will doubtless be diminished, and the exportation of gold will cease under existing circumstances.

It is presumable that the pressure for money which has prevailed for some months, will soon be partially, and perhaps extensively relieved, as it is announced that the United States Bank intends to increase its loans, and the State Banks will be enabled to follow the example. The duration of this relief must however, be very doubtful, and prudence will dictate that it be not relied upon to any great or durable extent.

The present current rate of exchange on England is 103½ to 104. Virginia Bank stock 102½ to 103. Farmers' Bank stock 100 to 100½. The late loan to the state of \$100,000, was taken at 103½ for 5 per cent. stock, by a foreign house.

x.

July 25, 1834.

COMPARATIVE MORTALITY.

A curious official paper has been circulated, by order of the House of Commons, showing the comparative mortality in many large towns, &c., of the kingdom, from 1813 up to the present year. Among the towns included in this comparative calculation of mortality are, Leeds (town,) Bradford, Holbeck, Beeston, Wigan, Preston, Norwich, Bolton-le-Moors, London, Bury, (Lancashire,) Essex, &c. The result of the investigation of mortality may be concisely stated as follows:—Of children born there die, in Leeds, 53 per cent. under 5 years of age, and 62 per cent. under 20 years of age; in Bradford, 47 per cent. under 5, and 59 per cent. under 20 years of age; in Beeston, 39 per cent. under 5, and 52 per cent. under 20 years of age; in Holbeck, 50 per cent. under 5, and 62 per cent. under 20 years of age; in Norwich, 42 per cent. under 5, and 50 per cent. under 20 years of age; in Bolton, 49 per cent. under 5, and 61 per cent. under 20 years of age; in Wigan, 48 per cent. under 5, and 59 per cent. under 20 years of age; in London, 38 per cent. under 5, and 46 per cent. under 20 years of age; in Rutland, 29 per cent. under 5, and 37½ per cent. under 20 years of age, &c. It further appears, that in Essex, Rutland, and the metropolis, persons live to an advanced age in a greater extent than others.—*Morn. Herald.*

PRESERVATION OF FRUIT TREES FROM HARES.

According to M. Bus, young fruit-trees may be preserved from the bites of hares, by rubbing them with fat, and especially hog's lard. Apple and pear trees thus protected, gave no signs of the attacks of these animals, though their footmarks were abundant on the snow around them.—*Bullet. Univers.*

ON THE PRAIRIES OF ALABAMA.

By W. W. M'GUIRE. (In a letter to the Editor.)

From Silliman's Journal of Sciences.

From the period of the first settlement of this state to the present time, the prairies have been objects of great curiosity and have attracted much attention; still, although the field for scientific investigation is so rich and interesting, no one has, to my knowledge, attempted a minute examination of it. The striking peculiarities of the soil, of geological configuration, and organic productions, especially in shells and other marine substance, which are found scattered indiscriminately over the prairies, are well adapted to attract attention, and to excite investigation respecting the period and causes of the formation of the prairies and their fossils. Many who have never conceived of the possibility of any great change of the surface of the earth, except that produced by the deluge recorded in the pentateuch, attribute to that event, the present position of these shells. Others, taking a still narrower view, believe them to have been removed by the agency of men from their native beds to the place where they are now found.

My own observations, although limited, have satisfied me that the prairies once constituted the boundary of the Atlantic Ocean. In support of this opinion there are still existing many satisfactory proofs, although ages must have elapsed since those changes took place; strong evidence also exists that this great change has been affected by the elevating power of earthquakes, volcanoes and subterranean heat. The face of the country, from the mountains to the prairies, is rough and uneven, presenting an outline differing from all other hilly or broken countries which I have ever seen. It abounds in iron pyrites and pebbles. Beds of good iron ore, of anthracite and bituminous coal, and of limestone and sandstone, are found in several places.

The country lying between the prairies and the sea coast is generally, if not altogether, of the same character as that on the coast from the Potomac to St. Mary's, viz: level sandy plains, some fertile, some sterile, either dry or swampy, and covered with pine, oak, cypress, cane, &c; but it generally, perhaps universally, shows the distinctive peculiarities of the above named coast. The changes in all places are sudden and abrupt, changing from the peculiar soil and character of the prairies, to that of the coast, which is sterile, in some places almost pure silica; or of alluvial formation along the rivers, swamps and marshes, differing in fertility, according to the portions in which silica and vegetable matter are mixed in their composition. This tract of country is from one hundred to one hundred and thirty miles wide, perhaps more.

In speaking of the prairies, the rock formation claims particular attention. It is uniformly found below the prairie soil, at various depths, ranging from ten to fifteen feet, and it sometimes projects above the ground. This rock is generally known by the name of rotten limestone; when removed for several feet on the top, and exposed to the action of the atmosphere for some time, it assumes a beautiful white color. In its soft state it is easily quarried, and blocks of almost any dimensions can be procured. It has been dressed by planes and other instruments, and used in building chim-

neys, some of which have stood twelve or fifteen years without injury or decay. A summer's seasoning is requisite to fit it for building. This rock has been penetrated by boring to depths varying from one hundred to five hundred and fifty feet; after the first six or seven feet, it is of a bluish or gray color, but still soft, except in a few instances, where flint strata of a foot thick or more have been met with. On perforating the rock, a full supply of good water is always obtained, which uniformly flows over the top. I have heard of no constant running stream of water over this rock, except one in Pickens county, near the lower line. The superincumbent earth is for a few feet composed principally of stiff clay, of whitish color; then comes the mould or soil, which is very black—in wet weather it is extremely mairy and stiff, and in dry, very hard and compact.

Shells, such as the oyster, muscle, periwinkle, and some other kinds, are found in great quantities throughout almost all the prairies of Alabama and Mississippi; the first named being the most numerous, mixed in every proportion with the others. The oyster shells are perfectly similar to those now obtained from the oyster banks on the shores of the Atlantic. The largest beds of shells in the open prairies seem to occupy rather elevated but not the highest places. They have probably been removed from the more elevated situations by torrents of rain. It may be that the lowest places never contained any shells; or if they did, as vegetable matter accumulates in greater quantities in low situations, they may have been thus covered. In some instances I believe they have been found in such places, several feet below the surface. They are not found in very large quantities in the timbered prairies; and indeed, so far as I have observed, wherever the shells are numerous, vegetation is not so luxuriant as where there is a proper admixture of the decomposed or composing shells and vegetable matter.

These shells and other decomposing materials appear to have given a peculiar character to the prairie soil, which causes it to adhere so strongly to the legs of horses and to the wheels of carriages as to remain several days in travelling, unless washed or beaten off. Yet, when well broken up, at the proper season, and regularly ploughed, it remains quite mellow, producing corn and cotton equal to the best alluvial bottoms, with, so far as it has been tried, increased fertility; although from the compact nature of the rock beneath, and the tenacity with which it retains moisture, crops are injured sometimes by rains, but seldom by drought.

There being no opening or fissures, except above the rock, by which to convey the water directly to the channel of creeks and rivers, there are consequently no reservoirs to contain supplies for fountains and springs. In the winter and spring seasons the streams overflow and the land is literally submerged. In the summer and autumn neither springs or wells are to be found, except below the rock; yet notwithstanding this scarcity of water, there is seldom a lack of moisture for the purpose of vegetation. And at times when the drought is such as to produce fissures two or three inches wide and as many feet deep, the earth will be found quite moist at the depth of two or three inches.

As an evidence of the general moisture of the

prairie soil, below the surface, it may be remarked, that crawfishes are so very numerous in some situations as to prove very destructive to young corn, cotton, and other tender plants. After nightfall they issue from their holes or dens and commence their devastations. Their holes are of considerable depth, supposed to reach to the rock formation, a distance of from ten to fifteen feet; and on the surface of the ground regular and well built mud walls, five or six inches high are erected. The crawfish is of the crustaceous class, perhaps differing but slightly except in size, from the sea lobster. Their nocturnal perigrinations show that they differ at least in their habits, from the common crawfish found in our brooks.

Much of the soil is sterile, presenting low hills on which there is no timber; in other places, a small and stunted growth, such as black-jack and post oak. In some places there are considerable hills, having a thin stratum of excellent vegetable mould, covered with timber indicating a good soil; but from the close texture of the substratum, it is liable to be washed away, which has been the case in Washington and Clarke counties. In those counties, I am informed the rock projects more than in any other part of the prairies, and there are cliffs fifteen or twenty feet high.

There are open prairies of every size from one hundred to one thousand or twelve hundred acres mixed and interspersed in every form and mode with timbered land of all kinds; some producing only black-jack and post oak, not exceeding fifteen or twenty feet in height; others again covered with the most majestic oak, poplar, elm, hickory, walnut, pacaun, hackberry, grapevine and cane, equal in size and beauty, I understand to similar kinds in the Mississippi alluvions.

The extent of this country may not be unimportant. I am informed that traces of prairie soil may be seen in Georgia, perhaps as far east as Milledgeville. It is indeed said to exist in North Carolina; but of this I have not evidence such as to warrant the assertion. That it stretches nearly five hundred miles eastward from the vicinity of the Mississippi on the west almost to Milledgeville, there is no doubt; and if it extends, as is said to be the fact, to North Carolina, it reaches four hundred or five hundred miles farther, being perhaps nine hundred or one thousand miles long, and from forty to sixty in breadth.

That the prairies were once the boundary of the Atlantic is evident. 1. From the fact, that on both sides, they exhibit the indented and irregular appearance of a coast, uniformly stretching up the large water courses; and in general, the sandy low country stretches in a corresponding degree up the rivers into the prairies; but except it is more or less alluvial, is unlike the prairies. 2. They are nearly or quite parallel to the present shore. 3. The great quantity of sea shells, found scattered on so large a tract of country, very little of which is within one hundred miles of the sea coast, support the opinion now advanced. The idea of their having been carried thither by action of winds or tides, is precluded by the fact, that in that case, they must have been raised three or four hundred feet, and I presume in no place less than one hundred above the level of the Gulf of Mexico.

That the change was the effect of earthquakes, is evident from the appearance of the Mississippi. The "father of rivers" bears strong marks, that

long before the earthquakes of 1811 '12, its course had been altered by some more powerful convulsion of nature; for its mighty current runs strongly against the seven bluffs below its junction with the Ohio, (except at St. Francisville,) seeming still to contend for its ancient channel. The prairies themselves afford strong proof of this position; for, in many places, they present the appearance of having been *lifted up*, and they are, in fact, considerably higher than the surrounding country. Much of the country of which I am speaking, besides the prairies, has that peculiar undulating appearance which corresponds with the expansive heavings of earthquakes.

To this theory an objection, at least, may be raised. Why is it that aquatic remains are not found between the prairies and the ocean? It may be replied that the marine exuviae in the low country have long since been decomposed, while the shells in the prairies have remained in some instances, entire, for the want of suitable agents to act upon them; indeed, the prairies themselves illustrate this observation, for in all places where vegetable matter in considerable quantities has been brought to act, the shells are rapidly decomposing or have nearly passed through this process, and the vegetables have in consequence obtained a luxuriant growth. While on the other hand, in situations where shells are found in nearly their original state, it is readily perceived that the mass of actually decomposing materials, (except a partial influence of air and water,) is in small proportion to the whole accumulation.

The prairies present a more lovely and fascinating prospect in the spring and summer, than the liveliest imagination can picture. They are then clothed in the richest livery of those seasons—

"Plains immense, and interminable meads,
Lie stretch'd before—where the wandering eye,
Unfix'd is in verdant ocean lost,
Another flora there, of bolder hues,
And richer sweets, beyond our gardens pride,
Plays o'er the fields, and showers with sudden hand,
Exuberant spring."

Herds of cattle and flocks of sheep, are seen in the distance, cropping the fresh grass, or wandering at pleasure over the flowery region. Yet the absence of large trees, is amply repaid, by the rich garniture of grass, flowers and shrubbery. The odors of the wild rose, hawthorn, &c. load the summer's breeze with the most delicious perfumes. During the hottest and most sultry weather, when in other places, every thing is drooping and withering from excessive heat, a cool breeze is "ever on the wing." This is owing to the elevation of the prairies and the absence of timber.

During my last visit to the prairies, I found a substance existing in considerable quantities, resembling the coral, or some of the zoophytic families. It is nearly as hard as flint rock. I collected several specimens, but have lost them. Some months back, I saw in the possession of a gentleman, several very interesting prairie specimens. They were said to be *Shark's teeth*, from an inch to an inch and a half in length, slender and very sharp. Among them are also species of the vertebrae of fishes. They were procured in a section of the prairies which I have never visited; which abounding in specimens of the kind just mentioned, is the most interesting portion of this singular country.

It is a well established fact, that the earth and sea have undergone frequent and violent revolutions; and that the change that left the prairies dry is the most recent, is evident from the perfect state which shells, &c. are now found and from the fact that vegetation in many places, has made but slow progress. The nature of the soil indicates some ingredient adverse to many kinds of plants. But it is evidently fast changing, and it is not unlikely, that in the course of time, it will entirely lose its distinctive character and become perfectly amalgamated with vegetable matter. The process of decomposition and reproduction is rapidly going on in most places, and at every successive crop of plants, more matter is added, for the final accomplishment of the great change. It would be an interesting subject of inquiry whether the woodlands are not gradually encroaching upon naked places; and if so, it would show at once that the prairies are by natural operations, slowly losing their peculiarities.

Postscript.—A gentleman of Clarke County, Alabama, states, that on his plantation are parts of the back bone of some animal from eight to ten inches long, and proportionally large in circumference—some still held together by the cartilaginous ligatures. Many of the early settlers used them instead of *andirons*. There is no canal for the spinal marrow. An early settler informed him, that he had seen an entire skeleton, on the surface of the earth; it was of enormous dimensions, longer as is reported, than the largest whale,

chandise will hardly keep pace with the increasing population of America. Still, as the condition of men is improving, and society and nations are becoming more intimate and friendly in their relations, and curious in their inquiries, we may suppose that travel for gratification will greatly increase between the two—this is proved by the number and constant increase of fine ships as packets; and it fairly indicates, in connection with the extent to which steamboats are coming into use, and the long voyages which they occasionally make, that the time is not distant when the packet ships will be propelled by steam. No rail road can be laid across the Atlantic. It will be an object to have each of the two ports in Europe and America, from whence most of these ships may be expected to depart for the other, situated conveniently as it respects the interior parts of the country, and as near together as may be. The wearisomeness of a long sea voyage will render these considerations indispensable, and may lead to some changes not now much thought of.

But to leave this part of the subject for a while, and dwell more particularly on our own United States.

To attain the greatest rapidity of motion will always be an object of controlling importance, and therefore level regions will be greatly desirable for the location of the principal thoroughfares. The intercourse and exchanges between the north and the south, must increase vastly beyond all precedent, and probably beyond all present anticipation of the most enthusiastic, for as speed of transportation increases, and the cost is reduced, the productions of each of the various climates will be vastly more consumed in the other climates; and the assumption is, that transportation by land will gradually take the place of water navigation, first, for persons travelling, and then for merchandize, and particularly on account of its expedition, safety, and regularity. This consideration is made stronger, from the fact that much of the interior, and the finest portion of North America, and that which will soon be the most productive and most densely settled, and of course require the greatest exchanges of this quarter, is already as near by land to the most important productions of southern climates, as it is to our eastern commercial ports. It is not too early, then, to begin the inquiry, where shall be our principal and leading roads? for it is plain that they are not yet located, and that they cannot be determined on judiciously without the most grand and enlarged views, and the most extensive and accurate surveys.

Without attempting to speak of details, which can of course be only determined by such surveys, it is pertinent, and may be profitable to notice, that the formation of the country, and the condition and wants of the citizens, present and future, clearly indicate that the road already commenced at Albany, must be continued without any regard to navigable waters, on the best and most level ground westward, indefinitely. That another road from Norfolk, or perhaps from Boston, must proceed southwardly over the level region, near the coast all the way, to some harbor where a town is yet to spring up near the south cape of East Florida, from whence there will be a busy steam-boat intercourse with Havana; that a branch of this road will proceed, say from Savannah, to New Orleans, and thence into Texas, and onward,

SPECULATIONS ON RAIL ROADS,

From the American Rail Road Journal.

Has it never occurred to you that the capital vested in many rail roads and canals, is likely, if not exceedingly profitable at the commencement, to be eventually lost, from the roads and canals being superseded by others which may be made afterwards? The great and ultimate object of these improvements, is to facilitate exchanges—to cheapen and expedite transportation to and from market—as, between the great coal region, or between the great agricultural west and the best market, whether Philadelphia, New York, or Boston. Now, if it be assumed that transportation by rail roads, or by some better roads, steam being the impelling power, shall supersede, where practicable, *all other modes of locomotion*,—and I do not suspect myself of being alone in the opinion that there is no extravagance in such an assumption, particularly when we notice the progress of things in Europe—it is no more than reasonable to begin to contemplate, and try to foresee and act upon the natural and inevitable results which must follow, and to lay them before the public, that they may be fairly in view, and have proper consideration in the mind of every man, or company, when coming to a determination in regard to any proposed improvement, both as respects its location and the manner in which it shall be completed, or the amount of capital which may be safely invested in it.

The climate and productions of Europe and North America are so nearly alike, that as the state of science and the arts in these quarters of the world continues to come nearer to an equality, it is fair to conclude that the exchanges of mer-

onward. That another principal road will be from this new city on the Cape of Florida, into the great valley of the Mississippi. This brings me back to the thoughts which put me upon this essay, the errors likely to be made in the location of rail roads. I perceive some are designed to communicate only between one inland water navigation and another. These may prosper long enough to refund their cost; but the day is not distant when they will have comparatively little value.

Finally, as your journal is likely to be extensively preserved for future reading and reference, and as I am an old man, and shall hardly trouble you many times more, I ask of you the further favor to record a few prophecies.

First, fresh water navigation, including that of the Mississippi and all its tributaries, will be discontinued, probably within twenty years.

Secondly, New Orleans, and all cities in unhealthy situations, will greatly decline, and new cities and towns spring up in more healthful and advantageous situations, and that the queen of these will be somewhere at a point not yet thought of in the great valley.

And thirdly, that either Boston or Halifax is destined to take the sceptre from the highly favored city of the island.

And to conclude, again I would most respectfully hint to the men of Boston (and for this I hope they will remember my children) two things—first, to spare no pains, nor grudge any capital either in the location or construction of their westward and southward rail roads; and secondly, to turn their attention to European steam packets on a large scale. I beg pardon: Boston folks need no hint from me on their own affairs.

C. O.

Deep Creek, Sept. 5, 1833.

BOAT BRIDGES FOR RAIL ROADS.

From a Camden (S. C.) paper.

Much apprehension is entertained, as to the difficulty of passing the Santee or Wateree, for the want of a bridge. If the reader will refer to the Journal of the Franklin Institute for June, 1832, he will see the matter scientifically discussed and illustrated. We add a letter from a traveller who speaks of it in a familiar manner.

Boat Bridges.

Extract of a letter from a gentleman who has recently travelled in Germany.

"The boat bridges on the Rhine appeared to me, to be as capable of taking as great a load as the Columbia bridge.* The Diligences in that country, weigh about 3000 lbs. without a load, and carry from twenty to thirty passengers; and, on the top much merchandize, &c. They could easily take all the cars I have ever seen on the Charleston Rail Road, with all their load.

"The Rhine at Cologne is, very much such a river as the Santee. It overflows in the same way. At Cologne, high walls confine it. Just above Cologne, the mountains begin. At Mentz, the low grounds between the mountains on each side of the river commence—and so it continues till you get to Basle in Switzerland.

* For the information of strangers, it is well to observe that this bridge is built on the shoals, and that it has a foundation of the very best kind.

"These boat bridges are in various places, viz: Cologne, Bonne, Coblentz, Mentz, Worms, Spieres, Mannheim, Strasburg, &c. I have often thought such bridges would admirably suit our state.

"Seven, eight or twelve boats are anchored in the stream, and the anchors are secured with piles of stone. The boat has a considerable (query chain) cable attached to the anchor, so as to rise and fall with the freshet. Uprights are framed upon these boats, and bridges thrown across them—each boat answering for a pier. A swinging platform is fixed on the shore—this is connected with the main bridge, by a falling bridge, (a draw bridge,) lifted up by ropes fixed on the principle of the crane. In this way the crossing is made to accommodate the rises and falls of the river. Places are also made to lift up the draws or bridge, to let the vessels pass up and down the river."

C.

ROAD MAKING.

From the National Intelligencer.

Replies to questions by Mr. John Davis, dated 27th Nov. 1822, from Hagerstown.

Line of the road.—This branch belongs to the engineer, and no general directions can be given respecting it.

Surface or bed of the road.—The bed of a road is the soil of the country, after being made smooth, and as level as circumstances will admit.

The great object of road making, is to preserve this bed from wet, which assails it both from below, and from above; the under water is to be kept off by side drains, that shall always keep the water of the soil some inches below the level of the bed, at every season of the year, and should the line be so level and low as that no sufficient fall can be got to bring the water of the soil below the bed of the road, in such case, the bed must be raised above the level of the water.

This principle of preserving the bed of a road from lying in water, is founded on the reason that if a road be laid in water, the sub-soil is kept soft, and the road will surely be pressed into it by heavy carriages—and in winter the frost affects that wet soil so as to lift up the whole mass—by which it is loosened, and on a thaw is broken to pieces. These reasons have been found sufficient to induce the abandonment of the former practice of digging a trench, into which the road was placed, and which ensured the bed of the road being wet at almost all seasons of the year.

The wet from above is to be kept from the bed by the materials (or as we term it the metal) of the road, broken of stone, of angular form, skillfully and carefully laid on, forming a body so compact as to be an effectual cover or roof to prevent water from penetrating from above.

Having secured the bed or natural soil of the country from wet, it is of itself sufficiently strong to carry any weight; there is, therefore, no necessity for the bottom or foundation, as it is called, of large stones, which, if they were not injurious, are objectionable, on account of the useless expense; but this bottom is positively injurious, inasmuch as it is constantly shaken by heavy carriages, which keeps the upper stratum always loose and open to receive rain water.

When the *bed* is duly prepared and dry, the stone (or as we call it the metal) is to be laid on, not all at once, but in layers of three inches thick, after the first three inches are laid on, it is to be subjected to the traffic, or if the road is not open to traffic, then to be rolled with the iron roller; when there is showery weather: or it must be wetted by water thrown upon it—for you will find that no stone will consolidate when perfectly dry.

When the first coat of metal has in some degree settled and become consolidated, a second coat of three inches thick, is to be laid on and rolled as before, unless you have traffic—in which case great care must be taken to rake the road constantly with the iron rakes, filling the tracks made by every carriage so as not to be seen by that succeeding, until the road is quite consolidated, after which it will take no damage, nor fall into ruts from any shape or size of wheel, or weight of carriage.

Much has been said and written upon the *strength* of roads—my experience leads me to the conclusion, that six inches thickness of well broken, well laid stone, is quite sufficient, provided the *bed* be made and kept dry. I have of late years made no new road thicker; but have, on the second year, given it an addition of three inches, loosing a little the hard surface of the road, about an inch deep, to allow the new and old metals to join and unite in a compact body—going upon the principle that the natural soil is the real carrier, both of the road and the carriages, and that if it could be kept dry by any other means, the artificial road would be altogether unnecessary, and as six inches of metal is as effectual a proof, or covering, as a larger quantity, there is no use in being at the expense of more.

Materials for metal.—The gradations of quality in this country, of stone for roads, are considered to be—*first*, granite,—*second*, good flint,—*third*, hard lime stone.

In America, where the summers are dry, and hot, I should prefer hard lime stone to flint—because the latter is very apt to become loose in very dry weather; but whatever materials be used, it should be broken very small; in recommending six ounces as the proper size, I went as far as the then old prejudices would admit; but experience has convinced me, that half the size is more useful and more profitable to the country. When the stone is well broken and properly applied, there is no occasion for the covering of gravel or slate—and I object to it as preventing the consolidation of the stone by keeping the pieces apart, whereas they should unite by their own angles. The slope of a road should be as little as possible, to throw off the surface water; and I have found an inch in a yard, from the centre to the side, to be sufficient; if the surface be smooth and solid, no water can stand on such a slope—and the more you can allow carriages to stand upright, the easier they will run.

The reason of recommending the laying on of the stone at different times, and in layers, is, that if the whole quantity be laid on at once, the underpart never consolidates properly, but continues loose, and is apt to be shaken by heavy carriages, and thereby to loosen the upper part, so as to make the road receive rain water.

Having resided fourteen years in America, I am aware of the severity of the frost, and of the

heavy and sudden summer showers. These circumstances make it more necessary to be very attentive to keeping dry the *bed* of your roads, as frost will assuredly reach them every winter; whereas, the frosts of this climate are not so violent, and do not reach the bottom of our roads, perhaps on an average of seven years.

On hilly ground, great care should be taken to keep the side water ways clear and open, otherwise rain water will get in under the road, and seek its way between the metal and the *bed* down the slope, for a great distance.

In a country like America, where many new roads must necessarily be made, it is of the greatest consequence to follow the most economical course, in order to make the funds appropriated to roads, produce the greatest sum of good to the public.

The old system of digging trenches, and filling them again with stone, is to be avoided as a very useless waste of the funds, it being evident that the expense of this mischievous process is greater than making the same length of road on good principles.

JOHN LOUDON MACADAM.

BONE-DUST FOR CULTIVATION OF GRAIN.

The exportation of bones from Germany to England constitutes a singular epoch in the annals of commerce. Myriads of tons have been already exported without glutting the market, or causing a cessation of the demand. In the vicinity of the North Sea, mills have been erected to pulverize them. This bone-powder, or bone-dust, was long ago exclusively applied to the purposes of hot-houses by German horticulturists; but the English, emboldened by their riches, have extended its use to general objects of agriculture, and fertilize, by these expensive means, their cold, humid, and poorest land; and have thus brought the uplands of Nottinghamshire, the western parts of Holderness, &c., into the highest state of cultivation, both in point of extent and intenseness of fertility. There is, consequently, a proverb, "that one ton of German bone-dust saves the importation of ten tons of German corn." As Malta formerly covered her naked rocks with foreign soil, so does England now fertilize her clay and sandy heaths with German bones. Near the sea-coast even the churchyards are robbed of their venerable relics, which is only ironically excused by rendering the German bone trade popular. An agriculturist, being rendered attentive by this vast exportation, instituted privately some comparative experiments, the results of which prove that bone-dust acts in the cultivation of grain, as compared to the best stable manure,—1. In respect to the quality of corn as 7 to 5;—2. In respect to quantity as 5 to 4;—3. In respect to durability of the energy of soils as 3 to 2. It produces several collateral advantages;—1. It destroys weeds;—2. It diminishes the necessity of suffering the land to lie fallow;—3. This concentrated manure, or substitute for manure, is more easy of conveyance, less laborious to spread, and can with facility be applied to the steepest vineyards or other inaccessible lands, either in mountainous countries or in wet meadow land;—4. It renders agriculture practicable without cattle-breeding, grazing, &c.—*Repertory of Inventions.*

EELS.

From Mr. Jesse's Cleanings.

Several pages are devoted to the economy of these curious creatures, and as many points of their history are warmly contested, Mr. Jesse's experience is valuable.

That they do wander from one place to another is evident, as I am assured that they have been found in ponds in Richmond Park, which had been previously cleaned out and muddled, and into which no water could run except from the springs which supplied it.* An annual migration of young eels takes place in the River Thames in the month of May, and they have generally made their appearance at Kingston, in their way upwards, about the second week in that month, and accident has so determined it, that, for several years together it was remarked that the 10th of May was the day of what the fishermen call eel-fair; but they have been more irregular in their proceedings since the interruption of the lock at Teddington. These young eels are about two inches in length, and they make their approach in one regular and undeviating column of about five inches in breadth, and as thick together as it is possible for them to be. As the procession generally lasts two or three days, and as they appear to move at the rate of nearly two miles and a half an hour, some idea may be formed of their enormous number.

Eels feed on almost all animal substances, whether dead or living. It is well known that they devour the young of all water-fowl that are not too large for them. Mr. Bingley states, that he saw exposed for sale at Retford, in Nottinghamshire, a quantity of eels that would have filled a couple of wheel-barrow, the whole of which had been taken out of the body of a dead horse, thrown into a ditch near one of the adjacent villages; and a friend of mine saw the body of a man taken out of the Serpentine River, in Hyde Park, where it had been some time, and from which a large eel crawled out. The winter retreat of eels is very curious. They not only get deep into the mud, but in Bushy Park, where the mud in the ponds is not very deep, and what there is, is of a sandy nature, the eels make their way under the banks of the ponds, and have been found knotted together in a large mass. Eels vary much in size in different waters. The largest I ever caught was in Richmond Park, and it weighed five pounds, but some are stated to have been caught in Ireland which weighed from fifteen to twenty pounds. Seven pounds is, I believe, no unusual size. The large ones are extremely strong and muscular.

TO FREE FRUIT-TREES FROM MOSS AND INSECTS.

Mr. James Thomas, of Derveruden Green, near Chepstow, has found the following mixture an excellent application for the purpose. The

* I have been informed, upon the authority of a nobleman well known for his attachment to field sports, that, if an eel is found on land, its head is invariably turned towards the sea, for which it is always observed to make in the most direct line possible. If this information is correct (and there seems to be no reason to doubt it,) it shows that the eel, like the swallow, is possessed of a strong migratory instinct. May we not suppose that the swallow, like the eel, performs its migrations in the same undeviating course?

mixture is made by taking five bushels of well-burnt lime fresh from the kiln, and slacking it with hot water, in which salt has been dissolved. When the lime has fallen to a fine dry powder, add, by small quantities at a time, a bushel of soot, stirring it in till the two ingredients are completely incorporated. Advantage is to be taken of the first foggy day, when the trees are damp, but not dripping, to dust them over with this powder. One man may treat fifty trees in a day, and the operation in Mr. Thomas's opinion, should be repeated twice a year; the first time in March, and the second time in October or November. Mr. Thomas has likewise found, that the grass beneath his trees, which used to be full of moss, has now become a fine sward, quite free from moss, no doubt in consequence of these particles of the composition which fell to the ground during the dusting of the trees.—*Transactions of the Society of Arts.*

THE MOLE.

It is remarkable that this animal sometimes gives notice of a change of weather. The temperature or dryness of the air governs its motions as to the depth at which it lives or works. This is partly from its inability to bear cold or thirst, but chiefly from the necessity: it is under of following its natural food, the earth worm, (*Lumbricus terrestris*), which always descends as the cold or drought increases. In frosty weather, both worms and moles are deeper in the ground than at other times, and both seem to be sensible of an approaching change to warmer weather before there are any perceptible signs of it in the atmosphere. When it is observed, therefore, that moles are casting hills through openings in the frozen turf, or through a thin covering of snow, a change to open weather may be shortly expected.

The cause of this appears to be as follows:—The natural heat of the earth being for a time pent in by the frozen surface, accumulates below it; first incites to action the animals, thaws the frozen surface, and at length escapes into the air, which it warms and softens; and if not counter-balanced by a greater degree of cold in the atmosphere, brings about a change. Changes from frosty to mild weather, caused by the ascent of heat from the earth, are often so evident, that the circumstance needs no confirmation. Stronger proof, if proof were necessary, cannot be given than the common appearance of frost or snow remaining longer upon ground having a stratum of rock beneath, than upon that where there is none. Old foundations of buildings, which have not been dug out, are easily traced by the same appearance; and any subterraneous solid body, as large stones, drains, planks, or pieces of timber, may be discovered in the same way; and even a plank laid across a ditch at such times will remain covered with snow for many hours after the snow on the ground is all melted and gone. This sufficiently accounts for the activity of the mole before a change of weather, and deserves to be noted by the meteorologist among his other prognostics of the weather.

The mole, though generally a despised and persecuted animal, is nevertheless useful in some degree to the husbandman, in being the natural drainer of his land, and destroyer of worms. To other inferior animals he is a sapper and miner, forming for them their safe retreats and well secured dormitories.—*Magazine of Natural History.*

DIARY OF THE TEMPERATURE AND STATE OF THE WEATHER, FROM APRIL 1, TO JUNE 30, 1834,—OBSERVED AT FORT MONROE.

APRIL.	THERMOMETER.			WEATHER.	WINDS.	MAY.	THERMOMETER.			WEATHER.	WINDS.	JUNE.	THERMOMETER.			WINDS.	WEATHER.
	VII. A. M.	II. P. M.	IX. P. M.				VII. A. M.	II. P. M.	IX. P. M.				VII. A. M.	II. P. M.	IX. P. M.		
1	55	63	62	cloudy.	E.	1	54	62	61	fair.	N. E.	1	69	76	71	S.	rain.
2	63	62	56	"	N. E.	2	55	63	60	cloudy.	N.	2	69	81	72	S. W.	fair.
3	50	50	48	"	"	3	54	52	52	fair.	"	3	67	76	73	"	"
4	44	48	43	rain.	"	4	56	63	60	"	S. E.	4	69	77	67	N. E.	"
5	41	44	41	"	"	5	61	67	69	rain.	W.	5	63	71	67	S. W.	fair.
6	44	48	47	"	"	6	58	73	65	fair.	"	6	65	71	69	"	"
7	52	48	52	cloudy.	"	7	65	76	64	"	S. W.	7	68	76	74	S. W.	"
8	51	60	57	fair.	S.	8	62	64	59	rain.	E.	8	71	80	78	"	"
9	53	61	56	rain.	N.	9	56	68	63	fair.	S. E.	9	73	84	82	"	"
10	51	56	51	cloudy.	N. E.	10	56	74	60.	"	S.	10	75	89	83	W.	"
11	49	54	53	"	"	11	57	75	70	"	S. W.	11	78	83	79	"	"
12	51	56	54	"	"	12	66	67	64	"	"	12	66	72	68	"	"
13	54	58	55	"	"	13	54	63	57	"	N.	13	68	82	76	"	"
14	53	58	56	fair.	"	14	48	68	66	"	S. W.	14	69	74	70	"	"
15	55	64	58	cloudy.	"	15	49	54	50	"	N. E.	15	68	73	68	S. E.	cloudy.
16	56	66	60	"	E.	16	44	56	53	"	N.	16	70	74	70	E.	"
17	57	74	69	fair.	"	17	49	64	58	"	S. W.	17	68	76	76	N. E.	fair.
18	57	66	62	cloudy.	N. E.	18	57	65	63	"	"	18	72	82	76	S.	"
19	57	64	62	"	E.	19	61	75	71	"	"	19	69	81	76	"	"
20	56	65	61	fair.	S. W.	20	70	76	71	"	S.	20	72	79	75	S. W.	"
21	58	72	70	"	S. E.	21	71	78	69	"	S. W.	21	69	81	74	N. W.	cloudy.
22	64	80	73	"	S. W.	22	70	82	72	"	"	22	73	86	82	N. E.	"
23	66	78	72	"	"	23	66	80	73	cloudy.	E.	23	74	84	78	S. E.	"
24	58	72	60	"	S. E.	24	70	76	70	"	S. W.	24	76	82	75	N. W.	"
25	58	64	52	rain.	N. E.	25	69	74	72	rain.	W.	25	72	84	78	S. E.	"
26	46	56	55	cloudy.	N. W.	26	69	74	70	fair.	S. W.	26	74	91	83	S.	"
27	40	62	53	"	N.	27	68	70	68	cloudy.	E.	27	75	79	75	N.	"
28	48	68	60	fair.	W.	28	67	71	68	"	S. E.	28	79	85	79	N. E.	"
29	55	61	54	cloudy.	S. W.	29	68	70	69	"	"	29	74	87	78	N. W.	"
30	54	60	58	fair.	"	30	67	72	68	"	E.	30	75	80	77	W.	"
31						31	67	72	70	"	S.	31					"
Total No. of degrees.				1700		Total No. of degrees.				2004		Total No. of degrees.				2249	
1596				1846		18184				2144		2180				2396	

ABSTRACT FOR THE QUARTER.

MONTHS.	THERMOMETER.						WINDS.										WEATHER.								
	Highest degree.		Lowest degree.		Mean temperature		Hottest Day.	Coldest Day.	N.	N. W.	N. E.	E.	S. E.	S.	S. W.	W.	Prevailing.	WEATHER.							
																		Fair.	Cloudy.	Rain.	Snow.				
	VII.	II.	VII.	II.	VII.	II.																Days.	Days.	Days.	Days.
APRIL.	66	80	73	40	44	41	53	61	56	22	5	2	1	14	4	2	1	5	1	N. E.	10	15	5		cloudy.
MAY.	71	82	72	44	52	50	60	69	64	22	16	4		2	4	5	4	10	2	S. W.	20	8	3		fair.
JUNE.	79	91	83	63	71	67	71	79	74	28	6	1	3	4	2	3	9	5	3	S.	16	18	1		fair.

SEASON AND CROPS.

Essex county, July 5th, 1834.

To the Editor of the Farmers' Register.

The crop of wheat was very unpromising in the spring; we had about three weeks of dry weather in May, which is generally as destructive to the wheat crop, as three weeks of dry weather is to the corn crop in August; it enables the fly to destroy the growing branches, while the growth remains almost stationary, after which the crop is mostly dependent upon the latter branches, which never produce an abundant one, and but seldom an average one, unless the weather is peculiarly favorable, which was the case this year: for the dry weather was succeeded by frequent rains, which gave the wheat a rapid growth, and though the rains partially washed the bloom off and made the head in some degree defective, this was more than counterbalanced by an additional increase of product. The weather also became dry and fine a few days before it ripened, which saved it from the rust, which otherwise it would probably have had, as it was filled with sap—in consequence of which, it is probable the crop will be an average one, both in quantity and quality. After a warm dry spring we may anticipate a small harvest; after a cold and wet one an abundant harvest; the cold and wet keep the fly in check, and the wet causes the wheat to branch freely.

The corn crop at this time exhibits the most luxuriant growth, but this is by no means a proof that we shall realise an abundant crop, but rather to the contrary. A growth of corn uncommonly large for the quality of the land, requires a continuation of moisture to bring it to perfection, which is seldom the case in our climate, or else the moisture goes to support the life of the stalk, not to form the ear. Big stalks and little ears are not uncommon. A stalk of ordinary size for the quality of the land, early in the summer, is greatly to be preferred; though I have seen very small stalks produce abundant crops. One of the best crops of corn I have ever made, was remarkably unpromising in the spring and the early part of the summer, owing to the extreme dryness of the weather. An acquaintance who saw my crop, said he did not think I would make enough for seed, and said that he would furnish me; but about the right time the weather became very seasonable, and the little stalks began to tassel and silk, and by the time the ears had completed their growth, their ends hung down nearly to the ground, and proved a most abundant crop. * * * * *

FEEDING STOCK.

Mr. Howden, in the *Transactions of the Highland Society*, says, "as a summary of lengthened detail, it seems to me that the food for cattle, whether raised from the land in the shape of Swedish turnips, potatoes, or mangel wurzel, is not materially different, provided the crops are alike good of their kind. A less quantity, and inferior quality, of manure, will produce the potatoes even on land where the soil and climate are not so favorable; but I have ever seen, at the end of a rotation, the land upon which potatoes had been grown in the worst condition; and to obviate this, it is of use, I think, to cultivate a variety which covers well in the drill.

IMPROVEMENT OF WORN LANDS.

Brookfield, 12th July, 1834.

To the Editor of the Farmers' Register.

I observe in your Register for June, some remarks by S. B. from Powhatan, on "Exhausting and improving cultivation." In addition to his modes of improving exhausted or naturally poor land, I would beg to lay before your readers, a mode of improvement adopted in many parts of Europe, and particularly in England and Scotland. Many of your readers must be acquainted with it from theory, but I am not aware of its ever having been put properly into practice in this country. The mode to which I allude is, the fallowing of land with a crop of turnips and eating them off the ground with sheep, either the whole of the crop, or two-thirds of it, as it may be abundant or deficient. The mode as adopted in Scotland, where I have had it in extensive practice, is, land which is wished to be laid down in grass and in good condition, is well prepared in the early part of the season by repeated ploughing, as the nature or condition of the soil may require, until properly pulverized: the ground generally receives a partial manuring. Bone manure is generally used for that crop, and is sown in the drills with the machine at the same time the turnips are. In the absence of a supply of bone manure, stable-yard manure is used. The turnips are regularly ploughed, hoed, and thinned out to a given space, plant four plant, as the kind of root may require. Early in winter a moveable fence is used to inclose a space of the field proportioned to the number of sheep. In addition to the turnips, the sheep have oat straw or hay given to them in severe weather, which is placed for them in a moveable and covered rack, and this moveable fence is extended or removed from time to time as the whole are eaten off. The ground is then ploughed up for the reception of the grain meant to be sown in it. This mode of improving worn out or poor soils in Scotland, has been attended with the most beneficial results. Land which to my own knowledge a few years ago was scarce worth the fencing in, is now, from this mode of manuring, producing from thirty to forty bushels of wheat an acre. It is to be observed, that it does not generally succeed well in wet or low lands. From the difference of climate I am not from experience prepared to say that the same mode would be attended in this country with the same amount of beneficial result; but as so much is wanted here to improve worn out land, I should think the matter worthy a patient trial; if it failed, it could be no great loss—and if it succeeded it would be of incalculable benefit. The spirit of agricultural improvement in this country is now evidently beginning to expand itself. It is doubtless the duty and interest of every one to aid the good work so far as in their power. The number of emigrations from this part of the county is a source of general remark and regret; and it is doubtless a matter of deep regret, that so many of the industrious citizens of the Atlantic States should be compelled to remove to the far-off western country. And the general reason assigned for such emigration is, that the land here will not now, as formerly, repay the labors bestowed on it, or, in many instances, afford even a scanty subsistence to its owners. This failure, which is unjustly attributed to the ungrateful na-

ture of the soil, is the unavoidable result of an injudicious, improvident, and ruinous system (if it can be so called) of agriculture; but the fact that they carry with them the same injudicious system, is a matter of deeper and more serious regret, than the bare fact of their emigration. For, after they have labored hard for a few years to clear a few acres of land of its timber, they, by following their old system, must unavoidably after a few years have the same difficulties to encounter, and another removal farther into the interior be the result, until the whole face of the country, naturally rich and productive, become a comparative barren waste. These emigrants are termed the pioneers of the forests, and have to encounter many a hardship, and sacrifice many an endearing tie. But those men who become the owners of the lands which they have left, have a task no less difficult and arduous, and certainly much more delicate to perform than clearing land from wood. They, in order to obtain a subsistence, must reclaim land which has been exhausted by an impoverishing mode of farming, an object which can only be obtained after a lapse of time and much perseverance. Let the citizens of this commonwealth think on the numbers of their forefathers who died under the tomahawk and scalping-knife of the savage and unreclaimed Indian, in obtaining for them their *now* peaceful possessions, and on the thousands of patriots who died in the defence of their dearest rights, and in securing for their descendants a glorious liberty and independence. And was all this blood spilt to obtain a country so unproductive as not to supply her children with bread? Certainly not. Citizens of this happy and free country, providence has cast your lot in a land capable, under judicious management, producing every comfort, necessary, and luxury of life even to overflowing, and will you not avail yourselves of these important blessings? If means are amply in your own hands, it only wants example, energy and enterprise to secure to you and your children their full enjoyment. Your patriotic forefathers nobly withstood the efforts of a proud ambitious and invading foe, and victory and independence was their rich reward.

You have now a foe within yourselves in the internal management of your dearly purchased possessions, which strikes as deeply (and much more insidiously) at the root of your dearest interests, and which, if not speedily met and combatted with, must ere long present you with the appalling spectacle of your lands reduced to barrenness, and your children without bread. Come forward then, and let every energy be aroused, and every prejudice manfully combatted with, and you will have the pleasing reward of seeing yourselves and your children enjoying those blessings so hardly purchased, not only in peace, but in comfort, plenty, and happiness. This great, and rapidly increasing republic, already stands second to none in commercial importance and in the trading enterprise of her citizens. Why should she not also rank high amongst the first of nations for her agricultural enterprise and prosperity? Her ships, or rather her floating palaces are held up as models of naval architecture to the world: why should not her agricultural implements rank on the same scale? Surely they are of as much importance. Her mariners and machinists are considered equal if not superior to any in the civilized world: why

should not her agriculturists rank equally high? These defects in the general agricultural management of this country can only be ascribed to the not duly considering the paramount importance of a good system of agriculture to any country; and to this country in particular, with its rapidly increasing population, it is of vital importance. The good work requires only to be begun: Let but a few of its wealthy, enterprising, and influential farmers, adopt the proper measures for renovating their wasted lands, and the proofs of their unavoidable success will soon induce one and all of the cultivators of the soil to adopt similar measures. Then will there be fewer painful emigrations, greater comfort, and more contentment amongst the citizens of this highly favored land:

A. N.

P. S. The hint given by your correspondent S. B. as to the propriety and necessity "of your agricultural friends in different parts of the country, to give you a monthly report of the growing crops" is, I think, of essential importance to every farmer. My own observations are extremely limited, scarcely extending beyond the bounds of the farm I immediately superintend, and on which, I have only resided for a short time back. I will however, give you them as they occurred to me.

The wheat on this farm (Brookfield Henrico,) may be considered a deficient crop. It appears in the low lands to have suffered much during the winter, and it has also suffered much from a disease called in this neighborhood *stunt*; the term is new to me, as are also the general features of the disease, the most prominent of which are, that from one-fourth to one-half of a great part of the ears from the top of the ears downwards are destitute of grain. From the partial examination which I was enabled to give to the matter, I found generally the tap-root of each diseased head to be in a decayed state, and embedded in the chaff; when the grain was wanting, I could easily detect the presence of a very minute worm, or fly in that stage of existence—I think, deposited there before the flowering of the wheat. On this farm I think the high lands have suffered more from this disease than the low. The generality of farmers in this neighborhood complain much of the ravages of this disease; some of them calculating that their crops are deficient by one-third.

Our corn on this farm suffered much from the frosts of the 15th 16th and 17th of May—having almost the appearance of being entirely cut down. It however, on the return of mild weather, speedily recovered; and those parts of our crops which appeared to suffer most at that time, are now the most vigorous; and from eight to ten days in advance of those parts which suffered to appearance comparatively little injury.

A. N.

TO RESTORE FROSTED POTATOES.

A most effectual method has been discovered by a Cumberland gentleman. It is simply to allow the potatoes to remain in the pits, after a severe frost, till the mild weather is set in for some weeks, and allowing them to recover gradually. If once exposed to the atmospheric air, no art will recover frosted potatoes.—*Repertory of Inventions.*

PLANARIÆ.

On January the 27th, at the Royal Institution, Mr. Faraday proceeded to lay before the literati assembled, an account of Dr. R. Johnson's investigations into the *restorative, productive, and reproductive* powers of the Planariæ, a genus of small animals allied to the leech, and of which there are several known species, viz. *P. torva, lactea, hastata, arethusa, felina, &c.*, the three first of which are to be found abundantly in a pond near the Red-House, Battersea-fields.

From Dr. Johnson's experiments it appears, that if an incision be made longitudinally into the head of the animal, so as to separate its eyes from each other, if the cut has not been carried very far down, it will heal in the ordinary manner; but if the head be absolutely cleft in twain, then according to the extent of the fissure, there will be a mass of new matter formed by each half of the head, which will either join the two halves together, forming a head of extraordinary size, and bearing in it one or two additional eyes; or each old half, thus cleft, will form the new matter into another half, with an eye, and so the animal have two complete and entire heads. If the fissure be carried farther down through the body of the animal, then not only will there be two heads, but two bodies also formed, joined together only by the tail; and when this is the case, so little unanimity does there exist between these *siamoid* twin-planariæ, that they never pull or swim the same way; and so violent are their efforts, that they frequently, in the course of two or three days, tear the only remaining bond of union, their tail, in sunder, and then two distinct and perfect animals result.

If in a common planaria the head be cut entirely off, a new head will be formed; and if its lower extremity be removed, it will produce a new tail. In a planaria, which, by the operation above described, had been invested with two heads, these "nova capita" were successively severed for three several generations, and were immediately and perfectly renewed, and subsequently the animal was cut through just below the artificial bifurcation, and then only a single head was produced, so that in this more simple "capital" operation, a single-headed animal became a biceps, and, after having had the use of six heads in succession, was subsequently reduced to the possession of a single one.

When one of these animals is cut in half, the head, or anterior extremity, swims away as if nothing had happened, and speedily re-tails itself; but the tail swims to the bottom, and remains torpid for two or three days, by which time it has formed for itself a head. If a planaria be cut into three pieces, the head will form a new body and tail, the tail a new body and head, and the middle section, or body, will produce both head and tail. If a quarter be removed by making a longitudinal incision through the head, and half down the body, and then a semi-transverse cut to remove the upper quarter, not only will the three remaining quarters speedily reproduce a new fourth, but also the separated fourth will form to itself three new quarters. Indeed, a planaria has been cut into as many as ten pieces, and each piece has become an entire and perfect animal. In fact, this mode of propagation, which physiologists artificially institute, seems to be frequently resorted to by the animal

itself. The planaria felina has been seen to throw off pieces of its body, to form new animals, and these are not diseased but healthy parts, and not only parts of its tail, but often offsets from its sides, &c. Indeed, the planaria felina, and *P. arethusa*, have been never known to lay eggs, whilst the torva, lactea, &c. lay them in abundance, both the original animals, and those artificially produced. It would seem that those species which inhabit springs and running waters, propagate only by division; but those which dwell in ponds and ditches, where the water is occasionally exhausted, are oviparous, as well as viviparous.

The above facts are physiologically curious, as they show a still closer affinity than had been previously supposed to exist between the propagation of plants and animals by cuttings, as well as seeds; for they have shown that this mode of propagation can be carried to an almost equal extent in the one as in the other—an extent to which the experiments of Trembley, and others, on polypi, star fish, &c. did not reach.—*Medical and Surgical Journal*.

DISCONTINUANCES OF SUBSCRIPTIONS.

The close of the volume of a periodical published like this, is the time when all the discontinuances of subscribers are (or ought to be) sent in. The notices of this kind which we have received are fewer than were expected, and have been more than equalled by new subscriptions sent in during the same time. But though we have no reason to complain of the number of discontinuances, there is much ground for objection to the time and manner of a large portion of them. It is not probable that any reader of the Register could fail to know when the first volume closed—and then (according to usage and equity, and also according to our terms particularly stated in the May No.) was the time for all to discontinue who wished it, and who had not given earlier notice to that end. Instead of this, more than half the orders for discontinuances were sent in after the 1st No. of Vol. II, was mailed—some after the 2nd No.—and some from persons who had not, and have not yet, paid any thing, and therefore had no right to discontinue, even at a proper time. Still however, nearly all these requests have been promptly complied with, as we do not wish to retain any subscriber against his will. But, in our own defence, there must be some limit to such exactions, and a few of the latest and most inexcusable of these requests have been refused. The following letter relates to one of them, and may serve as an example of the hardship to which we are subjected in this respect.

— Post Office, July 17th, 1834.

SIR—Enclosed is \$5, which ———, a subscriber to the Farmers' Register at this office requests you to place to his credit, and discontinue his subscription. He has received two numbers of the Register for the present year, which he says, he will return if you wish it.

Yours, very respectfully,

P. M.

All scruples as to a failure in good faith, we suppose, are quieted by sending back the copies of Vol. II. and when this has been done, they generally are nearly ru-

ined for want of careful wrapping, and always burdened with postage for the editor to pay.

The receiving and paying for our publication is a mere business transaction between the subscriber and editor—and no one should hesitate to stop his subscription, who does not receive for it compensation in the value of the work. We consider that no apology is required for any discontinuance, and certainly shall never complain of them. But on the other hand, it is due to our interest and our just rights, and indeed to the very existence of our publication, that our terms, and the demands of common justice should be attended to in this respect: and therefore no request for discontinuance will be now allowed to those few who received one sixth part of our present volume, before sending the notice—nor to those who have not paid for the first volume.

After this time, our terms as to discontinuances will be strictly enforced. Orders to discontinue the next volume may be made, and will be properly entered on the list as soon as subscribers may please to send them—but not after the commencement of the volume desired to be discontinued.

Extract from the terms published in the 12th (or May) No. of Vol. I.

"No subscription will be permitted for less time than a year—nor hereafter, to commence otherwise than at the beginning of a volume. If a subscription is not directed to be discontinued before the first number of the next year has been published, it will be taken as a continuance of the subscription for the ensuing year: and no subscription will be discontinued while any thing remains due thereon, except at the option of the editor."

TO CORRESPONDENTS AND SUBSCRIBERS.

The following communications have been received—*Review of the Life of Oberlin, and remarks on his agricultural and economical improvements—On the climate of Virginia—Gas or Coal Tar—Suggestions, &c. by a correspondent from Granville, N. C.—On Tobacco Culture, continued, No. 3—Use of Lime as manure, in Pennsylvania—On the preservation of Tobacco plant beds.*

The next No. will contain an article on the various breeds of cattle, extracted from the latest edition of the most approved English work on this subject. The value of such descriptions greatly depend on the correctness and fidelity with which the plates or figures of the animals are copied—and we have taken much pains, and incurred a heavy expense, to attain that end. The wood engravings which we have procured for this purpose, will well bear comparison with the beautiful originals in the English work, and will do credit to the American artist (Horton of Baltimore,) whose talent is thus exercised for the Farmers' Register.

ERRATUM.

For Robert Batts, page 162, read Robert Batte.

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THE FARMERS' REGISTER.

Vol. II.

SEPTEMBER, 1834.

No. 4.

EDMUND RUFFIN, EDITOR AND PROPRIETOR.

ON THE BREEDING, REARING, FATTENING,
AND GENERAL MANAGEMENT OF NEAT CAT-
TLE.

Extracts from the last edition (1833) of the "Complete Grazier."

*Introductory view of the different breeds of neat
cattle in Great Britain.*

Of the various sources which compose the wealth of nations, there are few, perhaps, of greater moment, or which have a superior claim to attention, than that branch of rural economy which is the subject of the following pages. In fact, when it is considered, that not only the servants of a farmer, but also his cattle, are productive laborers; when we recollect the stimulus to industry, as well as the rapid circulation of capital which the farmer occasions, by furnishing constant employment to the numerous artificers who are occupied in manufacturing implements which are indispensably necessary to him; when we call to mind the immense mass of materials which his productive labor supplies for the purposes of commercial intercourse, and especially the influence produced by that labor on the comfort and appearance of towns, whose inhabitants must otherwise be destitute of the necessaries of life; when all these diversified circumstances are taken into consideration, every reflecting inquirer must acknowledge, that of all the ways in which a capital can be employed, this is by far the most advantageous to society.

Justly, therefore, has it been remarked, "that the capital employed in agriculture not only puts

into motion a greater quantity of productive labor than any equal capital employed in manufactures, but, also in proportion to the quantity of productive labor which it employs, it adds a much greater value to the annual produce of the land and labor of the country, while it increases the real wealth and revenue of its inhabitants."*

Many circumstances have long occurred to render live stock an object of the utmost importance to the farmer; and notwithstanding the great advances made in other branches of husbandry, none has undergone a greater change of system, or has received more manifest improvement, than the breeding, rearing, and management of cattle. Independently of the stimulus afforded, during the late war, to the exertions of the mere grazier by the rapid increase in the price of all the necessaries of life, the influence of many societies established of late years for the encouragement of agriculture has powerfully tended to promote inquiry, and to disseminate information on this interesting subject; while the patronage and example of several public spirited noblemen, and gentlemen of high rank, have diffused a taste for the pursuits of rural economy, that has had a most beneficial effect on the general prosperity of the country. Among these, none have attracted more attention than those which are discussed in the following pages; and, although the main object is to convey instruction on the points more immediately applicable to the business of the grazier, it is yet presumed that a concise outline of the principal breeds, and varieties of breeds of cattle found in this highly cultivated island, cannot but prove acceptable to every class of farmer.



1. *The Wild Cattle*—Of a bull of which race, the above is a portrait,—were the original stock of the kingdom, before enclosures were known. They are said to be still found at Chartley Park, in Derbyshire, and, perhaps, in one or two more; but it is believed, that the only pure breed is that preserved, in a wild state, at Chillingham Castle, in Northumberland, the seat of the Earl of Tankerville,

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whose steward, Mr. Bailey, thus describes them:†
"Their color is invariably white; muzzle black; the whole of the inside of the ear, and about one-

*Smith's Wealth of Nations, Vol. II. p. 53, Fourth edition.

†Agricultural Survey of Northumberland, Third edition p. 141.

third of the outside, from the tip downwards, red; horns white, with black tips, very fine, and bent upwards.* Some of the bulls have a thin upright mane, about an inch and a half or two inches long: the weight of the oxen is from thirty-five to forty-five stone, of fourteen pounds; and that of the cows, from twenty-five to thirty-five stone the four quarters. The beef is finely marbled, and of excellent flavor.

"From the nature of their pasture, and the frequent agitation they are put into, by the curiosity of strangers, it cannot be expected they should get very fat; yet the six years' old oxen are generally very good beef; from whence it may be fairly supposed that, in proper situations, they would feed well.

"At the first appearance of any person they set off at full speed, and gallop to a considerable distance; when they wheel round, and come boldly up again, tossing their heads in a menacing manner: on a sudden they make a full stop, at the distance of forty or fifty yards, looking wildly at the object of their surprise, but upon the least motion being made, they again turn round, and gallop off with equal speed; forming, however, a shorter circle, and returning with a bolder and more threatening aspect, they approach much nearer, when they make another stand, and again gallop off. This they do several times, shortening their distance, and advancing nearer till they come within a few yards, when most people think it prudent to leave them.

"The mode of killing them was, perhaps, the only modern remains of the grandeur of ancient hunting. On notice being given that a wild bull would be killed upon a certain day, the inhabitants of the neighborhood came in great numbers, both

horse and foot; the horsemen rode off the bull from the rest of the herd until he stood at bay, when a marksman dismounted and shot. At some of these huntings, twenty or thirty shots have been fired before he was subdued: on such occasions, the bleeding victim grew desperately furious from the smarting of his wounds and the shouts of savage joy that were echoing on every side. From the number of accidents that happened, this dangerous mode has been seldom practised of late years; the park-keeper alone generally shooting them with a rifled gun at one shot.

"When the cows calve, they hide their calves for a week or ten days in some sequestered situation, and go and suckle them two or three times a day. If any person come near the calves, they clap their heads close to the ground, and lie like a hare in a form, to hide themselves. This is a proof of their native wildness, and is corroborated by the following circumstance, that happened to the writer of the narrative, who found a hidden calf, two days old, very lean, and very weak; on stroking its head, it got up, pawed two or three times like an old bull, bellowed very loud, retired a few steps, and bolted at his legs with all its force; it then began to paw again, bellowed, stepped back, and bolted as before; but knowing its intention, and stepping aside, it missed him, fell, and was so very weak that it could not rise, though it made several efforts; but it had done enough; the whole herd were alarmed, and, coming to its rescue, obliged him to retire; for the dams will allow no person to touch their calves without attacking them with impetuous ferocity.

"When any one happens to be wounded, or grown weak or feeble through age or sickness, the rest of the herd set upon it, and gore it to death."



II. *The Devonshire breed*, delineated above, is supposed to have descended directly from the wild race. It is found in its purest state in North Devon; in the agricultural report of which district its peculiar qualities are thus described by the late Mr. Vancouver:—

"Its head is small, clean, and free from flesh

about the jaws; deer like, light and airy in its countenance; neck long and thin; throat free from jowl or dewlap; nose and round its eyes of a dark orange color; ears thin and pointed, tinged on their inside with the same color that is always found to encircle its eyes; horns thin, and fine to their roots, of a cream color, tipped with black,* growing with

* There is, however, a breed of the same cattle, in Yorkshire, which is said to be hornless. See the Introduction to the work entitled "British Husbandry," in the Farmer's Series of the Library of Useful Knowledge.

* The late Arthur Young, formerly secretary to the Board of Agriculture, describes thorough bred Devons as of a bright red, neck and head small, eye prominent and round it a ring of bright yellow; the nose round, the nostril having the same color; the horn clear and

a regular curve upwards, and rather springing from each other; light in the withers, resting on a shoulder a little retiring and spreading, and so rounded below as to sink all appearance of its pinion in the body of the animal; open bosom, with a deep chest, or keel; small and tapering below the knee, fine at and above the joint, and where the arm begins to increase, it becomes suddenly lost in the shoulder; line of the back straight from the withers to the rump, lying completely on a level with the pin, or huckles, which lie wide and open; the hind quarters seated high with flesh, leaving a fine hair ham tapering from the hock to the fetlock; long from rump to huckle, and from the pinion of the shoulder to the end of the nose; thin loose skin, covered with hair of a soft and furry nature, inclined to curl whenever the animal is in good condition and in full coat, when it also becomes mottled with darker shades of its permanent color, which is that of a bright blood red, without white, or other spots, particularly on the male; a white udder is sometimes passed over, but seldom without objection.

"This description may be considered as a summary of the perfections as to the exterior appearance of the animal: what, under the same head, may be regarded as defects, appear first in the sudden retiring of the vamp from behind the huckle to a narrow point backwards; the great space between the huckle and first rib; the smallness of the angle inwards at which the ribs appear to be projected from the spine or back-bone, often giving the appearance of a flat-sided animal, and in its being so much tucked up in the girth as to show an awkward cavity between the keel and navel, the line of which, it is presumed, should always be found to hold a position as nearly as possible parallel with that of the back from the withers to the loin. The animal is, however, generally well grown, and filled up behind the shoulder."

The North Devon cattle are highly esteemed both for feeding and draught; but are not so much valued for the dairy. For all the purposes of labor, whether activity, docility, or strength and hardness, this breed can scarcely be excelled; and it is even said that, on fallow land, it is no uncommon day's work for four steers to plough two acres with a double furrow plough. The ordinary average weight of the oxen, when fatted at five years old, is about eleven score per quarter; and that of full sized cows seldom exceeds eight.

In South Devon there is a mixture of the pure North Devon stock with a larger breed, of the same kind, called the *Old Marlborough Red*, which is said to have descended from the South Molton stock, although at present they differ materially from them in size, and in having a dingy brown or blackish color at the ears, nose, and round the eyes, or wherever the orange tint is observable in the genuine race. A cross with this species is, however, found to fatten more readily than the

pure South Devon, and is therefore generally preferred.

III. The *Sussex breed* differs but little from the Devonshire: when pure, the cattle are invariably dark red; and those which are marked with a mixture of either white or black, although passing under the denomination of *Sussex*, are always crossed with foreign blood. In other respects they are thus described by an eminent breeder,* the accuracy of whose judgement has been confirmed by many intelligent graziers.

"A thin head, and clean jaw; the horns pointing forward a little, and then turning upward, thin, tapering, and long; the eye large and full; the throat clean, no dewlap; leg and thin in the neck; wide and deep in the shoulders; no projection in the point of the shoulder, when looked at from behind; the fore-legs wide; round and straight in the barrel, and free from a rising back-bone; no hanging heaviness in the belly; wide across the loin; the space between the hip-bone and the first rib very small; the hip-bone not to rise high, but to be large and wide; the loin, and space between the hips, to be flat and wide, but the fore part of the carcass round; long and straight in the rump, and wide in the tip; the tail to lay low, for the flesh to swell above it; the legs not too long; neither thick nor thin on the thigh; the leg thin; shut well in the twist; no fulness in the outside of the thigh, but all of it within; a squareness behind, common in all long-horned beasts, greatly objected to; the finer and thinner in the tail the better.

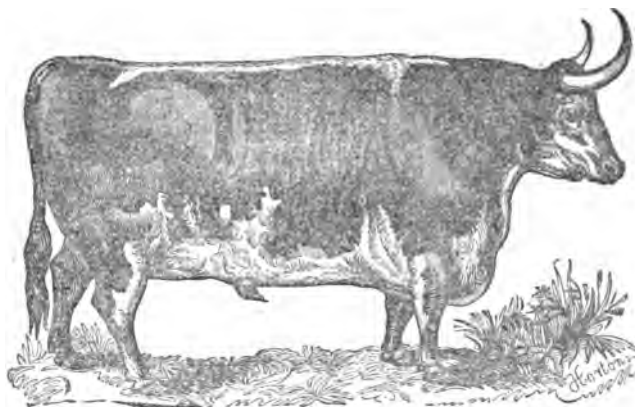
"Of these points, the *Sussex* beasts are apt to be more deficient in the shoulder than in any other part. A well made ox stands straight, and nearly perpendicular, on small clean legs; a large bony leg is a very bad point, but the legs moving freely, rather under the body than as if attached to the sides; the horns pushing a little forward, spreading moderately, and turning up once. The horn of the Devonshire, which very much resembles the *Sussex*, but smaller and lighter, is longer, and rises generally higher. The straightness of the back line is sometimes broken, in very fine beasts, by a lump between the hips."

On a comparison between the Devon and *Sussex* breeds, the former has been considered by competent judges as thinner, narrower, and sharper than the latter, on the top of the shoulder or blade bone; the point of the shoulder generally projects more, and they usually stand narrower in the chest; their chine is thinner, and flatter in the barrel, and they hang more in the flank; but they are wider in the hips, and cleaner in the neck, head, and horns, and smaller in the bone, than the *Sussex*; their hides are thinner and softer, and they handle as mellow. The distinction between them, however, is not very striking; they are equally profitable to the grazier, and, as working cattle, they both stand unrivalled.†

transparent, upright, tapering, and gently curved, but not tipped with black.—See *Agricultural Survey of Sussex*, p. 249.

* Mr. Ellman, of Glynde. See *Agricultural Survey of Sussex*, p. 231.

† See the *Agricultural Survey of Sussex*, p. 238 and Chapter II.



IV. The *Hereford breed* is a variety of the *Devon* and *Sussex*, but is larger and weightier than either; being generally wider and fuller over the shoulders or chine, and the breast, or brisket, as well as the after part of the rump. The prevailing color a reddish brown, with white faces; the hair fine, and the skin thin.

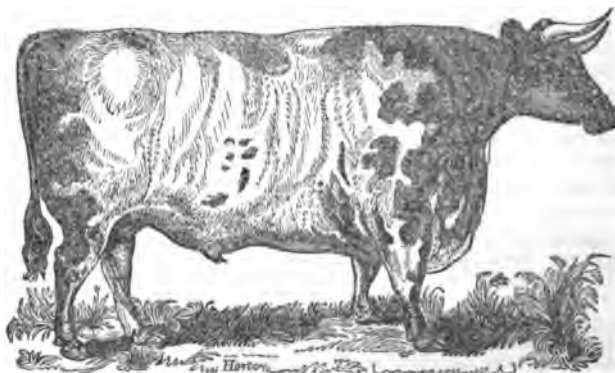
In the true bred *Hereford* cattle there is no projecting bone in the point of the shoulder, which in some breeds forms almost a shelf, against which the collar rests, but on the contrary tapers off; they have a great breadth before, and are equally weighty in their hind quarters; the tail not set on high; a great distance from the point of the rump to the hip bone; the twist full, broad, and soft; the thigh of the fore legs to the pastern joint tapering and full, not thin, but thin below the joint; the horn pushes aside a little, and then turns up thin and tapering; remarkably well feeling; mellow on the rump, ribs, and hip bone. The quality of the meat not hard, but fine as well as fat; little coarse flesh about them, the offal and bone being small in proportion to their weight; whilst their disposition to fatten is equal, or nearly so, to that of any other breed in the island. They are, however, ill calculated for the dairy; their constitutional disposition to accumulate flesh being in opposition to the qualities of good milking cows,—an observation which will equally apply to every breed, when similarly constituted. A breed of cattle equally adapted to

the shambles, the dairy, and the plough, is indeed not to be met with, and experience teaches that these properties are inconsistent with each other. The *Hereford* cattle are by many good judges considered to approach the nearest to that perfect state of any of the large breeds: they arrive early at maturity, and are fit for labor; but it is as fattening stock that they excel, and it is a different variety of the same breed that is preferred for the dairy. There is, indeed, a more extraordinary disproportion between the weight of *Herefordshire* cows, and that of the oxen bred from them, than is to be found in any other of the superior breeds: they are comparatively small, extremely delicate, and light fleshed; and it is said that they are not unfrequently the mothers of oxen nearly three times their own weight.*

On comparison with the *Devon* and *Sussex*, the *Hereford* breed will probably not be found equally active and hardy in the yoke; but it is generally considered to exceed them in the quality of fattening;† and when compared with any one breed, it may fairly rank at least among the very best in the United Kingdom.

* See the *Agricultural Survey of Herefordshire*, p. 118, and a Paper by T. A. Knight, Esq., in *Communications to the Board of Agriculture*, Vol. II.

† See Chapter II.



V. The *Short Horned Cattle*, under which denomination are indiscriminately included the *Dutch*, *Holderness*, and *Tees-water breeds*, are supposed to have acquired the appellation of *Dutch*, from a

cross with some large bulls that were imported, near a century ago, from Holland into Yorkshire, in the east and north ridings of which county the two latter had been long established. It has, however, been doubted whether any advantage was derived from this intermixture; for the increase thus obtained in size was thought to have been counterbalanced by a more than proportionate increase of oil. But, fortunately, the error was not universal; for some intelligent breeders aware, even at that day, of the superiority of symmetry to bulk, preserved the breed of which they were already in possession, in its native purity; and it is from some of that stock, so maintained, or, at least, from a cross between that stock and some of the progeny of the Dutch and Tees-water cross, that the present improved short-horned cattle, now generally distinguished as the *Durham*, or *Yorkshire breed*, are descended.

This breed was introduced about forty years ago, by the Messieurs Collings, of Darlington, and has rapidly risen in the public estimation. The cattle are very large, and are beautifully mottled with red or black upon a white ground; their backs level; throat clean; neck fine; carcass full and round; quarters long; hips and rumps even and wide; they stand rather high on their legs; handle very kindly; are light in their bone, in proportion to their size; and have a very fine coat, and thin hide. They differ from the other breeds, not only in the shortness of their horns, but as being wider and thicker in their form, and consequently feeding to greater weight; in affording the greatest quantity of tallow when fatted; and in having very thin hides, with much less hair upon them than any other kind except the Alderneys. They also possess the valuable properties of fattening kindly at an early age, and of yielding large quantities of milk; but the quality of the latter is not so rich as that of some other species;* they are, besides, rather tender constitutioned, and, consequently, difficult and expensive to winter.

Of this breed, Mr. Charles Colling, of Ketton, sold a bull—*Comet*—by public auction, in the year 1810, for the extraordinary sum of one thousand guineas; and the history of the celebrated *Durham ox*, the property of the same gentleman, is too remarkable not to merit attention.

He was bred in the year 1796, and at five years old was not only covered thick with fat upon all the principal points, but his whole carcass appeared to be loaded with it, and he was then thought so wonderful an animal, that he was purchased in

February, 1801, for £140, to be exhibited as a show: his live weight being then 226 stone, of 14 pounds. In the following May he was again sold for £250, to Mr. John Day, who, two months afterwards, refused for him two thousand guineas! He was exhibited in the principal parts of the kingdom until April, 1807, when he was killed, in consequence of having accidentally dislocated his hip in the previous February, and although he must have lost considerably in weight during his illness, besides the disadvantage of six years' travelling in a caravan, yet his carcass weighed 187 stone 12 pounds;* and Mr. Day stated his live weight at ten years old, to have been 270 stone.

Uncommon as this animal then was, he has, however, been since exceeded in size by a Yorkshire ox, bred by Mr. Dunhill, of Newton, near Doncaster, the carcass of which weighed, when killed, 264 stone 12 pounds; and he was supposed to have lost near forty stone while being exhibited in London.

Still more recently, another beast of uncommon size, fed by Lord Yarborough, has been exhibited under the title of "*the Lincolnshire ox*;" but, though bred in that county, from a favorite cow belonging to Mr. Goulton, he was got by a descendant of Comet, out of Countess, also of the Durham breed.† This extraordinary animal measured five feet six inches in height at the shoulders, eleven feet ten inches from the nose to the setting of the tail, eleven feet one inch in girth, and three feet three inches across the hips, shoulders, and middle of the back; the lowest point of his breast was only fourteen inches from the ground, and he stood one foot ten inches between the fore legs; the girth of the fore leg was nine inches.

The variety of this breed known as the Yorkshire Polled cattle, only differs from those already described, in being without horns; it is in considerable estimation among the London cow-keepers, as the cows are considered capital milkers, and at the same time maintain their flesh in a state nearly fit for the shambles.

	St.	lbs.	
* Viz. Four Quarters	165	12	} See Agricultural Survey of Durham, p. 230; and Mr. Day's Descriptive Pamphlet.
Tallow	11	12	
Hide	10	2	
	187	12	

† The native Lincolns are described by Mr. Stone, in his Survey of the county, as "generally large in the head, horns, bones, and bellies; thick, short, and fleshy in their necks and quarters; narrow in their hips, plates, chines, and bosoms; high in their rumps, and their shoulders not well covered; their eyes small and sunk in their heads." p. 57.

* See the Agricultural Surveys of the West Riding of Yorkshire, p. 248; and of Northumberland, p. 139.



VI. The *Long-horned cattle* are descended from a breed which had long been established in the Craven district, in Yorkshire; some cows of which race, and a Lancashire long-horned bull, of the kind delineated above, were brought, early in the last century, by a Mr. Webster, to Canley, in Warwickshire, where they produced a stock that soon became remarkable for its beauty.

Of this *Canley stock*, the late Mr. Robert Bakewell, of Dishley, in Leicestershire, procured some cows, which he crossed with a Northumberland bull,* and thus reared that celebrated race now so well known as the *Dishley breed*. They were long and fine in the horn, had small heads, clean throats, straight broad backs, wide quarters, and were light in their bellies and offal; and, probably from the effect of domestication and gentle treatment, remarkably docile: they grew fat upon a smaller proportion of food than the parent stock; but gave less milk than some other breeds; and the chief improvements effected seem to have been, in their aptitude to fatten early on the most valuable points, and in the superior quality of the flesh.

Notwithstanding the deservedly high reputation, as a breeder, enjoyed by Mr. Bakewell during his life, and which still attaches to his name, his judgement in selecting the long-horned cattle for his experiments has been called in question; and it has been asserted, "that had he adopted the *middle-horned breed*, either of Sussex, Devonshire, or Herefordshire, in preference to the inferior stock which the reputation of his name, and the mysterious manner in which his breeding system was conducted, have introduced, it would have contributed to exalt the superiority of his stock, beyond the power of local prejudices to remove."† The removal of local prejudice is not, however, an easy task, even when ill-founded, which it would be too much to assume in the present instance; for, whatever may be the merits of the long-horned cattle, comparatively with other breeds, it must be admitted, that they rank among the finest in the kingdom; and it is certain, that the perfection

which they have attained in the hands of the eminent breeders of the present day, has been acquired through the medium of the *Dishley blood*.

With regard to the "mysterious manner," in which Mr. Bakewell has been too generally accused of having conducted his business, it is a charge so vague and undefined, as hardly to merit remark; yet, as it conveys somewhat of reflection upon his character, it may be due to his memory to enquire upon what foundation it rests, and if examined closely, it will resolve itself into this:—that he was gifted with more than common acuteness of observation, judgement, and perseverance; which, combined with the experience he had acquired under his father, (who was also a distinguished breeder in his time,) he unremittingly applied to the improvement of cattle. Such qualities, directed to any one object, could not fail of success; and such, it may be fairly presumed, were the only mysteries he employed. That his practice was not open to the inspection of every one who sought to profit by it, will not surprise any person who is acquainted with the rivalry of eminent breeders; and, however it may be regretted that he has not left any record of his experiments, yet, as no man is bound to publish his transactions, his having omitted to do so cannot justly be made a ground of accusation.

The modern improvements made in the long-horned cattle, since the first attempts of Bakewell, are considered to consist chiefly in the coarser parts having been reduced, and the more valuable enlarged. The present breed is finer boned, and finer in the neck, throat, and breast; the back is straight, wide, and well covered with flesh; the rump is also wide, and particularly fleshy on the points, and about the root of the tail. Even when only in store order, the flank feels thick and fleshy, and in every part the animal handles loose and mellow.

Such, indeed, were always the distinguishing points of these cattle; but they were not thought attainable except they were fed on the richest pasture. This, however, has proved to be an error; for not only are they now found on land of no extraordinary quality, but it even appears to be generally admitted, that well bred cattle will do better on ordinary food than those of an inferior kind; it was indeed asserted by Bakewell, that this breed kept themselves in good condition on

* See Agricultural Survey of Leicester, p. 218. Mr. Marshall says, "a bull purchased in *Westmoreland*;" but he does not state the breed. See his *Rural Economy of the Midland Counties*, Vol. I. p. 269.

† Rev. Mr. Young: *Agricultural Survey of Sussex*, p. 226.

less food than any other of equal weight,* an opinion that seems to have been fully justified by the large prices that have been repeatedly given for the stock.†

* See the Agricultural Survey of Leicestershire, p. 219, and Chapter II.

† At a sale of Mr. Fowler's stock (of this breed at Little Rollright, in Oxfordshire, in 1791, fifteen head of oxen, five bulls and ten cows, were sold for various sums, amounting to £2464, or upon an average, at £164 each. The finest bull, named Sultan, only two years old, produced *two hundred and ten guineas*; and *Washington*, another of the same age, was sold for *two hundred and five guineas*; while *Brindled Beauty*, a cow, brought the sum of *two hundred and sixty guineas*; but, at a subsequent sale of stock belonging to Mr. Paget, in 1793, *Shakespeare*, a bull, bred by Mr. Fowler from a grandson of Mr. Bakewell's famous bull, *Twopenny*, and a cow of the Canley blood, was disposed of for four hundred guineas.

At a still later period, Mr. Princep, of Croxhall, in Derbyshire, is said to have refused £2000 for twenty

long-horned dairy cows, and 1500 guineas for the use of his best bull to thirty cows.

Large as these prices were, they have however, been exceeded by those actually obtained for short-horned cattle. At the sale already alluded to, of Mr. Charles Colling's stock, at Ketton, in the county of Durham, in 1810, seventeen cows and eleven bulls produced £4918, being an average of £175 10s. each. Of these two cows, *Countess* and *Lilly*, both got by *Comet*, were sold, the one for four hundred, and the other for four hundred and ten guineas. *Petrarch*, a bull, by *Favorite*, the sire of *Comet*, brought three hundred and sixty-five guineas, and *Comet* himself one thousand!

Still more recently, however, in February 1827, at a great sale of stock, the property of Mr. Rennie, of Phantassie, in East Lothian, (which amounted to the large sum of £13,582,) the highest price obtained for a bull of this breed was £115 10s., and for a cow £63; but, as not more than half the stock on the farm was supposed to have been sold, it is probable that some of the best cattle were reserved. Many other instances might however be adduced to prove—not that the relative value of the short-horned cattle has declined—but that extravagant prices are not now so generally given for superior stock, as formerly.



VII. The *Galloway breed* derives its appellation from the county of the same name, where, and also in some parts of the Lowlands of Scotland, these cattle are chiefly reared, and whence vast numbers are annually sent to Norfolk, and other English counties, to be fattened for the markets. In general they are black, or dark brindled; are without horns, except occasionally a small excrescence resembling them, and are rather under the medium size, being smaller than the Devons, though in some other respects resembling them, yet considerably larger than the north, or even the west Highlanders.

A true Galloway bullock is straight and broad in the back, and nearly level from the head to the rump; closely compacted between the shoulder and ribs, and also betwixt the ribs and the loins; broad at the loins, but not with hooked or projecting knobs. He is long in the quarters, but not broad in the twist; deep in the chest, short in the leg, and moderately fine in the bone; clean in the chop, and in the neck. His head is of a moderate size, with large rough ears, and full, but not prominent eyes, and he is clothed in a loose and mellow, though rather thick skin, covered with long, soft, and glossy hair.

In roundness of barrel, and fulness of ribs, the

Galloway cattle may perhaps vie with even the most improved breeds. Their breadth over the hook-bones is not, indeed, to be compared to that of some of either the short or long-horned, but their loins bear a greater proportion in width to the hook-bones, and they are shorter between the hooks and the ribs, which is in itself a valuable point, when accompanied with length of body. They are, however, rather coarse in the head and neck. Although short in the leg, they are generally fine in the bone; for, notwithstanding the prejudice that formerly prevailed in favor of large bone, the Moorland farmers, convinced that large boned cattle could not thrive on their barren hills, never aimed at increasing the size of bone above what their pastures would carry, and by this judicious management have preserved the Galloway breed in its purity. It is, however, to be regretted that sufficient attention has not been paid to its improvement; and in many parts of the Lowlands it has been materially injured by an inconsiderate intermixture with Irish and Ayrshire cows, in consequence of a prevalent idea that the latter are superior milkers. Bulls of the most approved kinds have indeed been introduced from England, but without any apparent benefit to the native stock; and although a cross between this and the

short-horned breed, which is not uncommon in the border counties of England, is said "to produce an excellent animal, possessing in a great degree the feeding qualities and best points of the short-horn, and the hardiness and docility of the Galloway cattle;" it is yet added, "that although the first cross with the short-horn does produce a good beast, no good breeder would choose to continue his stock from these crosses;"* and it seems to be now generally admitted, that the surest method of improving it consists in adherence to the pure breed. They certainly merit attention, for they already possess many valuable properties, which may yet be brought to still greater perfection. They are a hardy race, subsisting on the coarsest pastures, and increasing rapidly when removed to more favorable situations: they fatten kindly on the best parts; their flesh is of the finest quality;

and the joints being of a moderate size, more suitable for consumption in private families than those of the larger breeds, they usually command the highest prices at Smithfield.*

Of this breed there is a variety termed *Suffolk Duns*, from their color, which is generally of a yellowish hue, and from the county in which they were chiefly adopted. They are also polled, but possess little of the beauty of the original stock, and are chiefly remarkable for the abundance of milk given by the cows, on which account they are favorites with the London dairymen; the best milkers being said to give as much as eight gallons a day after claving, and six during great part of the season, wherefore much pains are taken to preserve the breed, and horned calves are never reared†.



VIII. The Highland Breed of Horned cattle are chiefly reared in the western parts of Scotland. Their horns are usually of a middle size, bending upwards, and their color is generally black, though sometimes brindle, or dun. Their hides are thick, and covered with long hair of a close pile, which nature seems to have intended as a protection against the severity of the climate under which they are bred, for they lose much of this distinction when reared in this country. In other respects they are not unlike the Galloway breed, many of whose best qualities they possess, and more particularly their hardiness of constitution, it having been repeatedly proved that they will thrive with such food and treatment as no tender cattle could endure; but, from being mostly bred in more exposed and mountainous situations, they rarely attain equal size.

Of this breed there are several distinct varieties, of which the principal are the *Kyloes*,—a short-horned breed, so named from the district of Kyle, in Ayrshire,—which are chiefly esteemed for the superior quality of the milk given by the cows: the *Argyleshire*, which are the largest of the real Highland breeds, and possess most of the properties already enumerated, except that they do not

milk so well as the *Kyloes*; and the *Dunlops*, another variety, so called from the estate on which they were originally bred, which has long been celebrated for the excellence of its cheese. These last are said to have been produced from a cross between a Highland bull and an Alderney cow, or, as some say, from an Alderney bull and an Ayrshire cow; but an experienced breeder, who has been long resident in the county, is of opinion that the improvement of the native stock is due to the introduction, about the middle of the last century, of some Dutch or Teeswater cows.‡ Their color varies from a dark brown, approaching that of the Devon, to the cream color of the Alderney, and in both cases generally speckled with white. The head and horns are small; the neck thin; little dewlap; round and straight in the barrel, and perfectly free from any disposition to rise in the back bone; the loin, and space between the hips, flat and wide; in the leg rather short than otherwise, bearing a general similarity to the breed from which they spring. In some parts they are known under the name of *Cunningham cattle*, also from a district so called in Ayrshire.§

* See p. 34.

† Young's Survey of Suffolk.

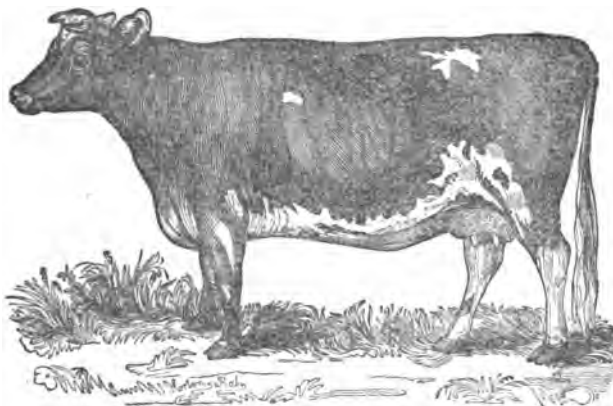
‡ W. Aiton: Treatise on the Dairy Breed of Cows, p. 22.

§ See the Agric. Surv. of the Isle of Man, p. 107.

* Library of Useful Knowledge: Farmer's Series, No. 12: Farm Report of Netherby in Cumberland.

The *Ayrshire Breed* ranks deservedly high in the estimation of dairy-men, and the most approved form of the best milkers is thus stated by

Mr. Aiton, to whom we are indebted for the annexed portrait.



"Head small, but rather long and narrow at the muzzle; the eye small, but quick and lively; the horns small, clear, bended, and the roots at a considerable distance from each other; neck long and slender, and tapering towards the head, with little loose skin hanging below; shoulders thin; fore-quarters light and thin; hind-quarters large and capacious; back straight, broad behind, and the joints and chine rather loose and open; carcass deep, and the pelvis capacious and wide over the hips, with fleshy buttocks; tail long and small; legs small and short, with firm joints; udder capacious, broad and square, stretching forwards, and neither fleshy, low hung, nor loose, with the milk-veins large and prominent; teats short, pointing outward, and at a considerable distance from each other; the skin thin and loose; hair soft and woolly; the head, horns, and other parts of least value small, and the general figure compact and well proportioned."

Besides these, there are the *Isle of Sky*, or *Western Kyloes*, from the counties of Ross, Southerland, Inverness, and Caithness—which are smaller than those already enumerated,—and a mixed race, partly horned, and partly polled; black, brindled, dun colored; which are annually driven in large numbers from the north to the English fairs, where they pass under the common appellation of *Scots*. They partake, in general, of the Galloway kindliness to fatten, and goodness of flesh; and, on the richer pastures of the south, soon become ready for the butcher.

The original *Welsh Breed* is supposed to have been the same as that which still exists at Chillingham, and is said to have been wild in the mountains so late as the reign of King John. From intermixture with lowland cattle, and subsequent crosses, various kinds are now found throughout the principality, almost differing as much from each other as the counties in which they are severally bred. That most generally known is distinctively called the *Anglesey breed*, though by no means confined to that part of the country. They are chiefly black, slightly marked with white, and have thick horns, of a medium length, curving upwards. They are small, and short in the leg, but well proportioned, and clean,

though not small-boned with deep-barrelled bodies, high and wide hips, deep chest, large dew-lap, and thin but commonly rough hides. They were favorites with Bakewell, who considered them as nearer to perfection—in some points—than any other except his own improved breed. The average weight of their quarters, when fat, at four years old, is from eight to eleven score pounds. They are very quick feeders, and make excellent beef; and the cows are generally good milkers.

The best kinds of this race of cattle are principally bred in the counties of Cardigan and Glamorgan, and in the southern and midland English counties, where they are in considerable demand for stocking inferior pastures. The small and hardy species, reared upon the mountains are commonly termed *Runts*; but they are far from being as despicable as might be supposed from that epithet, for they support themselves upon the hardest fare, thriving where some others would starve, and they are unrivalled as cottagers' cows. There is, however, a larger breed of brown color intermixed with white, and also having white horns; but they are long in the leg, thin in the thigh, and narrow in the chine. They are neither so compact as the black cattle, nor do they fatten so kindly, or make such good beef; but, though not in esteem with the grazier, they are active, and well adapted for the yoke.

X. The *Alderney Breed* are so named from the island, on the coast of Normandy, whence they were first imported, although they are also bred in the neighbouring islands of Guernsey and Jersey. The cows are small sized, but the oxen frequently attain a bulk and stature quite disproportioned to the female. Their color is either light red, dun, or cream-colored, mottled with white; the horns short and gracefully curled, and the bone fine.—They are chiefly valued for the dairy; and the best cows are observed to have a yellowish circle round the eye, with the skin at the extremity of the tail of a deep yellowish color approaching to orange: a remark, it may be noticed, that has been made on good milkers of other breeds.

Although the breeds throughout the Norman isles is nearly similar, yet that of Jersey is said to be better than that of Guernsey: it is certainly

smaller and more delicate; and so anxious are the inhabitants to preserve it in its native purity, that there is an act of their legislature which prohibits the importation of all foreign neat cattle whatever—even from the neighboring islands—under severe penalties of fine and confiscation, including the destruction of the animal itself, which in such case is slaughtered and distributed among the poor. When exported, the same act directs that they shall be accompanied by a certificate of their being natives of the island; but it is not easy to procure those of the best quality*. As fattening cattle, they have but few good points; being thin and hollow in the neck, hollow and narrow behind the shoulders, sharp and narrow on the hucks, light in the brisket, and lean on the chine, with short rumps, and small thighs; but their flesh is fine grained, high colored, and of excellent flavor. They are also very large in the belly; but this, as well as some of the points already mentioned, is rather an advantage to milch cows, to which purpose this stock is usually applied in this country; and their udder is well formed.

The Alderney cows are very rich milkers; and both on that account, and because of a certain neatness in their appearance, notwithstanding the defects of their shape, they command high prices. In this county, therefore, they are mostly in the possession of gentlemen who, rarely keeping a regular breeding stock, the cows are consequently crossed by any neighboring bull, and thus the pure breed is preserved in the hands of but very few persons.

There is a very prevalent notion that they will thrive on any kind of land, and they are therefore not uncommonly kept on bare paddocks, with the assistance of hay in winter. Like all light cattle, they certainly do not require the same support as larger animals; but their native pasture in the islands, is of the richest kind; and it is doubtless owing to the less nutritive herbage on which they are frequently fed in England, that the quantity of their milk is not equal to its quality. In Jersey they are also fed partly on parsnips, which are found to improve the produce of the cows.†

Such are the chief breeds of the kingdom; and the description, being taken from the best authorities, may be considered as accurate as possible, in a general view. But it must be admitted, that there are great deviations in many animals of the same, and of the most approved stock; and there are, besides, many crosses, and local breeds, distinguished by the name of the district, or the breeder, which it would be tedious to particularise.

Comparative view of the different breeds of neat cattle.

From the previous introductory view of the various species of neat cattle, the reader will probably be enabled to form some estimate of the value of the respective breeds therein described. The two kinds, however, which are chiefly reared, are the *long-horned* and the *short-horned*, and, concerning their merits and demerits, there has long been a difference of opinion among the most experienced breeders; on that subject, therefore, it may not be altogether useless to offer a few comparative remarks to the consideration of the young grazier.

It has been observed, by Mr. Culley, that "the long horns excel in the thickness and firm texture of the hides, in the length and closeness of the hair, in their beef being finer grained and more mixed and marbled than that of the short horns, in weighing more in proportion to their size, and in giving richer milk; but they are inferior to the short horns, in giving a less quantity of milk, in weighing less upon the whole, in affording less tallow when killed, in being slower feeders, and of a coarser make, and more *leathery* or *bullish*, in the under side of the neck. In few words, the long horns excel in the hide, hair, and quality of the beef; the short horns in the quantity of beef, tallow, and milk.—Each breed has long had, and probably may have, their particular advocates; but, if I may hazard a conjecture, is it not probable that both kinds may have their particular advantages in different situations? Why may not the thick, firm hides, and long close-set hair of the one kind, be a protection and security against those impetuous winds and heavy rains to which the west coast of this island is so subject; while the more regular seasons and mild climate, upon the east coast, are most suitable to the constitutions of the short horns?"*

It should, however, be understood, that the preference above given by Mr. C. to the long-horned species, on account of the superior quality of their beef, applies only to the variety of that breed which was selected, improved, and recommended by the late eminent Mr. Bakewell, and which is described in the introductory view already referred to, under the name of *Dishley breed*. In fact, Mr. C. is of opinion that "a breed of short-horned cattle might be selected, *equal*, if not *superior*, even to that very *kindly-fleshed* sort of Mr. Bakewell's, provided any able breeder, or body of breeders, would pay as much attention to these as Mr. Bakewell and his neighbors have done to the short-horns."†

This, as the opinion of an eminent breeder, is entitled to great attention; and it has been corroborated by a fact stated in the Agricultural Survey of Northumberland, "that the long-horns had been introduced into that country from the improved stocks of the midland counties, at different times, and by different breeders; but had, in most instances, given way again to the improved breed of short-horns, and, at the time the first report was published in 1804, had been totally abandoned by every breeder in the country; the improved breed of short-horns, from the stock of the Messieurs Colling, having proved themselves much superior."‡

Since that period, continued exertions have been made for the improvement of the short horned breed, and the great weight to which the cattle arrive must always ensure them a high rank in the estimation of those graziers who possess land of sufficient staple to forward heavy beasts; but the opinion of many of the best judges still continues to be divided regarding their comparative merit with that of the long-horns.

An experienced farmer, who appears to have examined both the breeds with great impartiality, states, "that the best of the short-horned being larger than any other kind require good keep, and more age than cattle in general: the oxen will improve to the age of seven years, and the cows to

* Quayle's General View of the Norman Isles.

† See Book II. chap. 2, note.

* Culley on Live Stock, p. 80. † Ib. p. 81.

‡ Page 140, 3d edition, 1818; in which the assertion remains uncontradicted.

six; and if they are not well supported when young, will require another year: that they have large bones, and are said to be coarse-grained, and the beef not so marbled as that of some other kinds; though some of them die very fine beef." But he adds, "that many have larger shoulders* than the Rollright [*long-horned*] breed: that the best of this breed, especially the heifers and cows, are formed for the butcher superior in shape to any other kind; and that, of the four kinds of cattle put in competition with the Rollright, viz. the Devon, the Sussex, the Hereford, and the Yorkshire, [*short-horned*], he is of opinion that none, at an early age, equal them for slaughter, or will pay so much money for three years' consumption."†

In confirmation of this, there is an opinion stated in several of the agricultural surveys of different counties, "that for beauty and symmetry of parts and disposition to fatten, the long-horned cattle are not to be excelled by any of their contemporaries;"‡ "that they come quickest to perfection;" § "are preferable to short-horns, better feeders, and lay most beef in the best joints; are more thrifty on poor land, and are preferred at Smithfield." || Yet notwithstanding the decisive tone thus assumed, the question of superiority may still be considered as undecided: each have their advocates. Thus the Hereford surveyor gives a decided preference to the oxen bred in that county, although he admits, that the long-horned cows are equal to the Herefordshire.¶ The Somersetshire graziers will not allow that the north-country oxen possess any merit, comparatively with the Devon, either for labor or slaughter; but the surveyor himself, while maintaining their superiority in the yoke, is candid enough to admit, "that they have many rivals in the Galloway, Leicester, Hereford, Glamorgan, and other cattle."** The late Mr. Davis, of Long-leat, an eminent agriculturist, although allowing that the comparative merits of the Devon and long-horned breeds are warmly contested in Wiltshire, yet gives it as his opinion, "that whatever may be the comparative merits of the two kinds of cows for the dairy, there is not a doubt but the Devonshire kind are the most proper for fattening; and, as to the oxen bred from the two kinds, it would be injustice to the Devonshire oxen even to make a comparison between them."†† Further trials of their respective qualities must be accurately made and faithfully recorded, before an undisputed preference can be awarded to either; for it cannot be concealed that local prejudice is often opposed to fact. The long-horns appear best adapted for grazing; being well protected by thick hides and long hair, and seemingly intended by nature for the range of pasture land. The short-horns, on

the contrary, have thin hides and short hair, and being of a more tender constitution than the former, and arriving to greater weight, seem better calculated for the system of stall-feeding; while the Devons have the advantage as working oxen.

The next in size to the short-horned, are the *Hereford*; the oxen of which breed commonly attain the weight of 70 to 100 stone, of fourteen pounds, and frequently arrive at much greater size. They are considered by a competent judge,* when compared with other fashionable breeds, "as rather larger in the bone, and somewhat shorter in the carcass; rising a little higher in the chine, towards the shoulders, but generally broad, which renders the chine thick and heavy. Their hucks are round, wide from one to the other, and well covered with fat; their rump is well formed, and the thigh rather heavier than some delicate breeds. Their shoulders are mostly large, in consequence of which they have more coarse boiling beef than they ought, and, notwithstanding they have a great propensity to fatten and die well filled with fat, it is often irregularly placed in patches." This defect is, however, probably owing to their having been worked; for although oxen that have been for several years at the yoke, will often become fat, it has been remarked that they are seldom so equally proportioned in every part with fat and lean as unworked steers, nor is the meat so juicy, and the brisket and lower parts are generally tough. When slaughtered at a proper age, the Herefords are heavily fleshed, the meat is fine in the grain and regularly marbled, with a better proportion of fat and lean than most other cattle, and they deservedly hold a high place in the estimation of the butchers. A writer of considerable experience on the subject, who has lately published a very interesting memoir of the short-horned breed, gives the preference to the *improved short-horns*, which he considers equal, at three years old, to Hereford cattle at four years old; and the cows as more profitable for the dairy. For breeders, he therefore decidedly recommends the short-horns; but he admits that the Herefords may be purchased with equal profit by graziers, whose only view is to fatten them for the market, because they will not—in a lean state at four years old—bear an increased price proportioned to the additional time required to render one of them equal to a short-horn of three years.†

An interesting experiment made at the Earl of Egremont's farm at Petworth, in Sussex, might, if it stood alone, be considered as, in a great measure, decisive of the relative value of this breed, as fattening cattle, to those of Devon and Sussex.—Eight beasts of the three breeds, taken indiscriminately from the stock, were put up to fatten on a mixture of barley-meal and flax-seed. For the first seven weeks they had each three gallons every day, of which one-fourth was flax-seed; and for the remainder of the time they had three gallons, of which one-third was flax-seed, ground together and mixed up with some wheat-chaff, both to facilitate digestion, and prevent it from sticking in their throats. Besides this, they had each thirteen pounds of hay weighed to them three times each

* This, it should be observed, is a defect; for although the shoulders cannot be deemed offal, yet are they, comparatively, less, as the flesh is of less value than that on the rump, loins, and chine: wherefore, the most perfectly formed cattle are those that are the longest, and have the smallest shoulders in proportion to their size.

† Parkinson's Treatise on Live Stock, Vol. I. ch. 1. sect. 15.

‡ Leicester Report, p. 218. || Rutland ditto, p. 121.

§ Lincoln Report, pp. 337, 339, 341, 2d edition.

¶ Hereford ditto, p. 118.

** Somerset ditto, pp. 242, 243, 3d edition.

†† Wilts ditto, pp. 204, 205, 2d ditto.

* Mr. Richard Parkinson, Treatise on Live Stock, Vol. I. ch. 1, sect. 16.

† See an Essay entitled "Improved Short horns, and their pretensions stated," by the Rev. Henry Berry, of Worcestershire, 1830.

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day. They were sixteen weeks fattening, and their respective weight when put up, and when fatted, was as follows:—

	Nov. 27.	March 19.	Gain.	
	cwt. qrs. lbs.	cwt. qrs. lbs.	cwt. qrs. lbs.	
No. 1.	17 0 7	20 2 0	3 1 21	Hereford.
2.	15 3 25	18 3 14	2 3 17	
3.	15 0 11	17 2 0	2 1 17	
4.	14 1 21	17 0 0	2 2 7	Sussex.
5.	14 0 25	17 0 0	2 3 3	
6.	14 0 25	17 0 0	2 3 3	
7.	13 2 7	16 2 0	2 3 21	Devon.
8.	13 0 14	15 0 0	1 3 14	

Thus, it will be perceived, that, *upon equal quantities of food*, the Herefords put on the most flesh; nor will it escape observation that, in that, the largest bullocks had the advantage. It has, indeed, been remarked, that the thorough bred Hereford cattle, that have attained their full size, require a less proportion of food to make them fat, than others of the same breed that are not so highly bred, nor so handsomely formed; and that, so far from requiring a larger quantity of food, they will consume a much less proportion than other smaller oxen of mixed breed.* To which it may be added, as a general remark, that, although small cattle will, on an average, consume less food than those of a larger size, yet the quantity is by no means in exact proportion to their weight; the advantage being usually in favor of the largest, when all other considerations are equal. On this particular trial it should also be noticed, that, although the plan of feeding on equal quantities was judiciously adopted, as a mean of ascertaining which breed would put on the most flesh with a limited amount of food, yet it cannot be deemed decisive of their relative qualities; for some would probably not have had sufficient to satisfy their appetite, and consequently would not thrive so fast as those which had enough, although, had they been allowed as much as they could eat, they might, perhaps, have increased in a more than equal proportion. Accordingly, another experiment, made nearly at the same time as the former, at Woburn, under the direction of the late Duke of Bedford, gives a different result, both as regards the breeds, and the weight of the cattle.

Six oxen, two Herefords, two Devons, one of the Sussex, and one of the Leicester long-horned, were put up at one time; and (with the exception of one of the Herefords, which had not any cake) were fed on equal quantities of oil-cake, *with as much turnips and hay as they could eat*, for an equal number of days, and their respective weights, at each period, were as follows:—

No.	Breed.	Food given.	Returned.	Consumed.	1st weight.	2d weight.	Live wt. gained.
					cwt. qrs. lbs.	cwt. qrs. lbs.	cwt. qrs. lbs.
1.	Hereford.	Turnips 3060 lbs. Hay " 43	360	2700	27 0 1	18 3 0	1 2 27
2.	Ditto.	Oil-cake 450 " Turnips 3040 " Hay " 34	26	424	18 1 0	21 0 25	2 3 25
3.	Devon.	Oil-cake 450 " Turnips 3090 " Hay " 376	12	438	14 1 7	17 2 7	3 1 0
4.	Ditto.	Oil-cake 450 " Turnips 3000 " Hay " 475	7	443	14 2 14	19 1 0	4 2 14
5.	Sussex.	Oil-cake 450 " Turnips 3030 " Hay " 443	17	433	16 2 0	19 3 0	3 1 0
6.	Leicester.	Oil-cake 450 " Turnips 3010 " Hay " 447	15	435	15 2 14	18 2 0	2 3 14

From this it would appear, that the Devonshire cattle were superior, as the ox (No. 4) of that breed, gained 185 lbs. more flesh than the Hereford ox (No. 2) upon a nearly equal quantity of food, of similar quality; and, in farther contradiction to the former experiment, as well as to common observation, that, in this, the cattle thrive in an inverse proportion to their weight, the smaller having the advantage. But it is also worthy of remark, that the difference was equally striking between the two Devons, though of equal weight; and this exemplifies the truth of an observation of daily occurrence, that cattle of the same breed, are yet of different constitution, and do not always possess an equal aptitude to convert their nourishment into fat. Thus it will be found, that of a score of bullocks of the same stock, age, and apparent quality, fed and managed alike, some will fatten much sooner than others, and arrive at greater weight; and that, in those which, when alive, appear equal to the eye and touch, a manifest difference will often be found when they are slaughtered. Therefore, however justly some breeds may be preferred, upon the general principle that the progeny partake of the disposition of the sire and dam, yet this theory is frequently contradicted in practice. The state of the parent

* See Agricultural Survey of Sussex, p. 248.

stock at the time of copulation, the health of the cow during the period of gestation, and the management of the calf during its growth, must all have an influence upon the future condition of the animal; and there are, doubtless, other hidden causes which have either escaped the observation, or are beyond the control of man. Experience has indeed proved, that although comparative experiments to ascertain the relative value of cattle are not to be slighted, yet that they are often contradictory; and, therefore, that the result is not always entitled to implicit faith.

In drawing a comparison between the Galloway and other most approved breeds, the surveyor of that district, although acknowledging their inferiority in respect of weight, yet maintains, that in many other of the most valuable qualities they do not come far short of any; and in the essential property of a tendency to thrive and fatten, the correctness of that opinion must be admitted; but it cannot be so readily conceded, as he asserts, "that when the merits of cattle come to be appreciated on just grounds, and the influence of quackish arts is at an end, many breeds which are now the most fashionable, will cease to attract attention; and the Devons and Kyloes will then, in all probability, be the only ones with which the Galloways will have to contend for pre-eminence."^{*}

In support of this opinion, the surveyor has produced a table of the relative proportions between a Galloway cow and two acknowledged, as he says, to be the very best of the long and short-horned breeds, in all those points which are considered to be of the greatest importance: from an examination of which the preponderance would appear to be in favor of the former. Perhaps he attaches too much weight to these comparisons, for it is not in form alone that value entirely consists: many beautiful cattle are deficient in constitution; and others, though very plain, possess great aptitude to fatten, and are superior milkers. But the table merits attention, apart from any comparison, as it displays, at one view, the proportions of chosen animals of three different breeds, and therefore, it is presumed, cannot fail to interest the reader.

The late Mr. Bakewell made many comparisons between different breeds of cattle, and it is much to be regretted that the observations of so acute and intelligent a man, and one so deeply versed in the subject, should be lost to the public; but he was singularly incommunicative; and there is little further known of his experiments, than that he put up three new milched cows, in separate stalls—a short-horned, a Scotch, and one of his own breed—and the result was, that the short-horned ate most food, and gave much the greatest quantity of milk; the Scotch ate less food, and gave less milk, but produced most butter; and the Dishley ate least food, gave the least milk, and made the least butter, but laid on the most flesh; whence it would appear, that the Kyloe cows are superior to the other two for the dairy-man, and the long-horned cows for the grazier; but this is by no means decisive of the relative value of the oxen.

The relative estimation of the flesh of the principal breeds at Smithfield market, and the average difference in price for the best qualities of each, in January 1833, are as follows:—

	s.	d.	
Scotch oxen, ...	4	8	per stone of 8 lbs. to sink the offal.
Leicester, Hereford, and fine short-horns	4	0 to 4s. 4d.	ditto ditto
Lincoln short-horns,	3	10	ditto ditto
Coarse inferior beasts,	3	6	ditto ditto

That consideration, which this important subject requires, has of late years been amply bestowed upon the improvement of British cattle; and beside the respectable breeder already mentioned, the labors of the late and present Dukes of Bedford, the Marquess of Exeter, the Earl of Egremont and Viscount Althorpe, of the late Mr. Fowler, Lord Somerville, and Mr. Westcar, of the Messieurs Colling, Culley, and Kitelee, Mr. Princep, Mr. Mason, of Chilton, Mr. Ashley, and Mr. Coke, of Norfolk, as well as of many other noblemen and gentlemen who have recently applied themselves to agriculture, and whose exertions, both as amateurs and professionally, claim the gratitude and good wishes of every real friend to his country—the various excellent societies established in many parts of Great Britain for the promotion of this public spirited purpose, have mainly contributed to the high state of perfection which this important branch of rural science has attained.

It has been hinted, when discussing the subject of buying cattle, that it will be advisable to select them, either from stock feeding in the neighborhood, or from those sorts which are best calculated for the nature and situation of the soil. This remark should be constantly kept in view, with regard to the breeding of cattle; let, therefore, that breed which is most profitable and best suited to the situation of the farm, first be ascertained; and, having succeeded in this desirable object, let it be the breeder's study to improve that sort to the utmost, by selecting and breeding from those which to beauty of form unite the more essential qualities of possessing kindly skins, and of weighing most in the valuable parts, together with a disposition to lay fat on the best points, as well as to fatten in a short period of time.

Before we conclude this subject, it may not be amiss to notice the neat cattle reared in the sister island. Few countries are, perhaps, so well adapted for the breeding of cattle of every description; and it is in consequence of this peculiar felicity of soil and situation, that our fleets are supplied with the immense quantities of prime beef necessary for the support of their crews.

The breed of *Irish cattle*, of which many thousand carcasses are annually exported, is distinguished by little variety, excepting that which necessarily arises from the difference of situation. They are remarkable for strength of constitution; and appear to be a mixed race, between the long-horned breed and the Scotch or Welch cattle. The counties of Meath, Roscommon, Clare, Limerick, Cork, and Tipperary, are chiefly celebrated for the vast herds which are there annually bred and slaughtered for exportation; and many of the most public-spirited breeders have, of late years, incurred very considerable expense by purchasing prime stock from England for the purpose of improving their breeds; a measure that has already been attended with the most beneficial effects, and which will doubtless, in the course of a few years, prove a source of great wealth to that island. It, however, cannot be denied that these exertions have not hitherto been sufficiently general to effect any very manifest improvement in the com-

^{*} Agricultural Survey of Galloway, p. 245.

mon stock of the country. The whole farming system of Ireland is defective; and, although grazing is better understood here than tillage, it is still in its infancy. The usual practice is to fatten in the field, on grass alone, without the assistance of artificial grasses, roots, or oil-cake. The beasts are purchased at the fairs without any regard to the breed; and being, in a large proportion, bred from cottagers' cows, which are necessarily taken from the worst stock, they are commonly ill-shaped and ill-thriven. The truth is, that capital is wanting; but it is to be hoped that those unhappy dissensions which had destroyed confidence will now no longer distract so fair a portion of the empire, and that so promising a field for the enterprising agriculturist will not continue to suffer neglect.

A COW OF THE GALLOWAY BREED COMPARED WITH TWO OF THE BEST LONG AND SHORT-HORNED BLACK CATTLE.

	Brindled Beauty, bred at Glencaird, in Minningaff. Height 44 inches.	Yellow Dishley, bred by Mr. Bakewell. Height 53 inches.	Difference.		Inches nearly.
			In favor of Gal- loway.	In favor of Long Horns.	
Width of Hooks	Inches. 20½ by 6 = 123	Inches. 21½ by 5 = 107½	Inches. 15½	Inches. 26	2½
— Loin	15 " 6 " 90	16 " 5 " 80	10		1½
Length of Quarter	18 " 6 " 108	19 " 5 " 95	13		2
— Back	54 " 6 " 324	70 " 5 " 350	4½		5
— Space	8 " 6 " 48	10½ " 5 " 52½	47		8
Girth at the Rib	83½ " 6 " 499½	90½ " 5 " 452½	39		6½
— Chine	69 " 6 " 414	75 " 5 " 375	1		1
— Neck	29 " 6 " 174	35 " 5 " 175	1½		6½
— Shank	6 " 6 " 36	7½ " 5 " 37½			1½
Proportion, as 45 to 54, or as 5 to 6.					
Brindled Beauty, as above. Height 44 inches.					
Phœnix, bred by Mr. Charles Colling. Height 56 inches.					
Proportion, 54 : 7 = 44 : 55.					
Width of Hooks	20½ by 7 = 143½	26½ by 5½ = 147½	10½	8½	1½
— Loin	15 " 7 " 105	19½ " 5½ = 105½	39½		5½
Length of Quarter	18 " 7 " 126	21 " 5½ = 115½	3½		5
— Back	54 " 7 " 378	61½ " 5½ = 338½	15½		2½
— Space	8 " 7 " 56	15½ " 5½ = 83½	15½		1
Girth at Chine	69 " 7 " 483	85 " 5½ = 467½	8½		1
— Neck	29 " 7 " 203	38½ " 5½ = 211½			
— Shank	6 " 7 " 42	7½ " 5½ = 41½			

General observations on buying and stocking a farm with cattle.

The profit to be derived from the occupation of land, depends so much on the command of the requisite capital, that the most important consideration for a young beginner is to be well advised on this essential point, and to be assured that he possesses sufficient means to turn every acre to the best account: bearing in mind, that a small occupation, with ample capital, will ever be found more beneficial than one of larger extent without the power of employing it to the greatest advantage; and that, more ground is generally as easy to be got (if success should enable him to hire it,) as it is usually difficult to obtain more money. Assuming it therefore as certain, that such a beginner is provided with that indispensable requisite, we shall proceed to state a few general hints on the buying and stocking of his farm with cattle; and shall introduce, under the respective accounts of rearing and breeding the different species, such remarks on their various merits and demerits as will materially assist him in the course of his labors.

The first object of attention, then, is to consider the proportion between his stock and the quantity of feed which will be necessary to support them. The nature, situation, and fertility of the soils that compose his farm are equally worthy of notice, as well as the purpose for which he designs more particularly to rear or feed his cattle; whether for the pail, or with the view of supplying the markets. In fact, it will be expedient to observe the greatest exactness in this proportion; because, in case he should overstock his land, he will be compelled to resell before the cattle are in a fit state for the market, and, consequently, at certain loss; while, on the other hand, he will incur a diminution in his profit, if he should not stock his land with as many cattle as it will bear.

Formerly, a great prejudice prevailed in favor of big-boned, large beasts, but it has been ascertained that this breed is, in point of profit, much inferior to the middle-sized kind; and, by a careful attention to the selection of stock, no inconsiderable progress may be made towards the improvement of the different species. Among the various professional breeders of modern times, few have attained greater celebrity than the late Mr. Bakewell, of Dishley, to whom we are indebted for many new and important improvements in the science of rearing cattle. The principle which he invariably adopted was, to select the best beast, that would weigh most in the valuable joints; so that, while he gained in point of shape, he also acquired a more hardy breed; and, especially by attending to the *kindliness* of their skin,* he became possessed of a race which was more easily fed and fattened than any other.

For many years, the invariable practice was to judge by the eye only, without regarding the other qualities of the animal intended to be purchased; but, in the present improved age, a more rational mode of forming the judgement has been adopted.

* As this expression may probably often appear in the course of the subsequent pages, it may not be altogether irrelevant to state, that it implies a skin which feels mellow, i. e. soft, yet firm to the touch, and which is equally distant from the hard, dry skin, peculiar to some cattle, as it is from the loose and flabby feel of others.

The sense of touch is now brought in aid of the sight; and, by repeated practice, the art of judging of the kindliness to fatten has been brought to such perfection, that any well informed breeder, who has personal experience, can, on examining lean beasts, tell, almost instantaneously, in what points or parts they will or will not fatten.

It might be expected that the result of such experience should be here stated, and some rules be laid down, by which a judgement on this important point could be formed; but, in fact, this knowledge can only be acquired by constant *handling* of both lean and fat beasts, and can only be described in general terms. Sir John Sinclair has justly remarked, that, "when the hide or skin feels soft and silky, it strongly indicates a tendency in the animal to take on meat; and it is evident, that a fine and soft skin must be more pliable, and more easily stretched out to receive any extraordinary quantity of flesh than a thick or tough one. At the same time, thick hides are of great importance in various manufactures. Indeed, they are necessary in cold countries, where cattle are much exposed to the inclemency of the seasons; and, in the best breeds of Highland cattle, the skin is thick in proportion to their size, without being so tough as to be prejudicial to their capacity of fattening."*

In the selection, therefore, of live stock in general, the young farmer will find it necessary attentively to consider the following particulars:—

I. *Beauty, or symmetry of shape*; in which the form is so compact, that every part of the animal bears an exact consistency, while the carcass should be deep and broad, and the less valuable parts (such as the head, bones, &c.) ought to be as small as possible. The carcass should be large, the bosom broad, and chest deep; the ribs standing out from the spine, both to give strength of frame and constitution, and likewise to admit of ample room for the intestines; but yet not so much as to be what is called *high-ribbed*, as the butchers consider it an indication of deficiency in weight of meat. Further, the shoulders ought not only to be light of bone, and rounded off at the lower point, but also broad, and well covered with flesh. The back also ought to be wide and level throughout; the quarters long, the thighs tapering and narrow at the round bone, but well covered with flesh in the twist; and the flank full and large. The legs ought to be straight below the knee and hock, and of a moderate length; light boned; clean from fleshiness, yet having joints and sinews of a moderate size, for the united purposes of strength and activity. In these points all intelligent breeders concur; but, as beauty of shape too often depends on the caprice of fashion, it is more requisite to regard,

II. *Utility of form*, or that nice proportion of the parts which has already been noticed.

III. *The flesh*, or texture of the muscular parts; a quality which was formerly noticed only by butchers, but the knowledge of which is justly deemed essential by the enlightened breeders of the present day; and although this quality necessarily varies according to the age and size of cattle, yet it may be greatly regulated by attention to the food employed for fattening them. As a knowledge of this requisite can only be acquired by practice, it is sufficient to state, that the best sign of

* "Hints regarding Cattle," p. 157, &c.

good flesh is that of being marbled, or having the fat and lean finely veined, or intermixed, when the animals are killed; and, while alive, by a firm and mellow feel.

IV. In rearing live stock of any description, it should be an invariable rule to breed from small-boned, straight-backed, healthy, clean, kindly-skinned, round-bodied, and barrel-shaped animals, with clean necks and throats, and little or no dewlap; carefully rejecting all those which may have heavy legs and roach backs, together with much appearance of offal. And, as some breeds have a tendency to generate great quantities of fat on certain parts of the body, while in others it is more mixed with the flesh of every part of the animal, this circumstance will claim the attention of the breeder as he advances in business.

V. In the purchasing of cattle, whether in a lean or fat state, the farmer should on no account buy beasts out of richer or better grounds than those into which he intends to turn them; for, in this case, he must inevitably sustain a very material loss, by the cattle not thriving, particularly if they be old. It will, therefore, be advisable to select them, either from stock feeding in the neighborhood, or from such breeds as are best adapted to the nature and situation of the soil.

VI. *Docility of disposition*, without being deficient in spirit, is of equal moment; for, independently of the damage committed by cattle of wild tempers on fences, fields, &c., which inconvenience will thus be obviated, it is an indisputable fact, that *tame beasts require less food to rear, support, and fatten them*; consequently every attention ought to be paid, early to accustom them to be docile and familiar.

VII. *Hardiness of constitution*, particularly in bleak and exposed districts, is indeed a most important requisite; and in every case it is highly essential to a farmer's interest to have a breed that is liable neither to disease nor to any hereditary distemper. A dark color, and in cattle which are kept out all the winter a rough and curled pile, or coat of hair, are, in the popular estimation, certain indications of hardiness: but it must be obvious to every thinking person, that this quality, though in some respects inherent in particular breeds, depends, in a great measure, upon the method in which cattle are treated.

There is, indeed, a rather prevalent opinion, that white is a mark of degeneracy, and that animals of the most vivid hues possess the greatest portion of health and strength; in proof of which it has been instanced that among mankind, a healthy habit is visible in the floridness of the complexion, as sickness is perceptible in the paleness of the looks, and the decrepitude of age in the whiteness of the hair. It has also been remarked that gray horses are commonly of a tender constitution, until crossed with darker breeds, and that among the feathered tribe, the common poultry, with high colored plumage, are in all respects superior to the white. But it has been justly observed in reply, that the powerful Polar bears, and many of the strongest birds, as the goose and swan, are white; nor will it escape observation, as more immediately touching the present subject, that the wild cattle are invariably of that color, and that the highest bred Herefords are distinguished by white faces.*

* It is stated in the Agricultural Survey of Leicestershire as the remark of a scientific observer of the

VIII. Connected with hardiness of constitution is *early maturity*, which, however, can only be attained by feeding cattle in such a manner as to keep them constantly in a growing state. By an observance of this principle, it has been found that beasts and sheep, thus managed, thrive more in three years, than they usually do in five when they have not sufficient food during the winter, by which, in the common mode of rearing, their growth is checked.

IX. A *kindly disposition* to take fat on the most valuable parts of the carcass, at an early age, and with little food, when compared with the quantity and quality consumed by similar animals. On this account, smaller cattle have been recommended as generally having a more natural disposition to fatten, and as requiring, proportionably to the larger animal, less food to make them fat; consequently, the greater quantity of meat for consumption can be made per acre. "In stall-feeding,"—the nature, method, and advantages of which will be stated in a subsequent chapter,—it has been remarked, that, "whatever may be the food, the smaller animal pays most for that food; in dry lands, the smaller animal is always sufficiently heavy for treading; in wet lands less injurious."* But this opinion is combated by many able judges, who still contend that the largest animals are the most profitable. They doubtless are so on good keep; but the smaller animals will thrive on soils where heavy beasts will decline.

X. *Working*, or an aptitude for labor: a point of infinite importance in a country whose population is so extensive as that of Britain, and where the consumption of grain by horses has so material an influence on the comforts and existence of the inhabitants. As, however, there is a difference of opinion on this subject, the reader is referred to the chapter where the question is fully discussed. But, whether kine be purchased for the plough, or for the purpose of fattening, it will be necessary to see, in addition to the essentials already stated, that they are young, in perfect health, full-mouthed, and not broken either in tail, hair, or in any respect; that the hair stare not, and that they are not hide-bound, otherwise they will not feed kindly. The same remark is applicable to cows intended for the pail, the horns of which should be fair and smooth, the forehead broad and smooth, udders white, yet not fleshy, but thin and loose when empty, to hold the greater quantity of milk, but large when full; provided with large dug-veins to fill it, and with four elastic teats, in order that the milk may be more easily drawn off.

XI. Beside the rules above stated, there are some particulars with regard to the age of neat or black cattle and sheep, which merit the farmer's consideration.

cattle usually bred in that county, "that those of a deep red, dark liver color, or black, with tanned sides, are the hardiest, and have the best constitutions; will endure the severest weather, perform the most work, live to the greatest age, and fatten on such food as would starve those of weaker colors." But in opposition to this we have, in the Annals of Agriculture, the assurance of Mr. Campbell, a practical and extensive breeder, that, upon repeated comparative trials, "he has had bulls, oxen, and cows, of a white breed, as healthy and hardy as any others."

* Papers of the Bath and West of England Society, Vol. X, p. 262.

"Neat cattle cast no teeth until turned two years old, when they get two new teeth; at three they get two more; and in every succeeding year get two, until five years old, when they are called *full-mouthed*, though they are not properly full-mouthed until six years old, because the two corner teeth, which are last in renewing, are not perfectly up until they are six."*

The horns of neat cattle also supply another criterion by which the judgement may be assisted, after the signs afforded by the teeth become uncertain. When three years old, their horns are smooth and handsome; after which period there appears a circle, or wrinkle, which is annually increased as long as the horn remains; so that, according to the number of these circles or rings, the age of a beast may be ascertained with tolerable precision, unless such wrinkles are defaced, or artificially removed, by scraping or filing; a fraudulent practice, which is but too frequently adopted, in order to deceive the ignorant or inexperienced purchaser with respect to the real age of the animal. These circles, however, must not be confounded with those ringlets which are sometimes found at the root of the horn, and which are a pretty sure indication that the animal had been ill-fed during its growth: another common consequence of which is, that the horns are crooked and unsightly. There is also a tip at the extremity of the horn, which falls off about the third year.

The bull is termed a *bull calf* until he is one year old, and then a *yearling bull*, or, in some places, a *stirk*, and afterwards a two, three, four, and five years old bull, until six, when he is *aged*. When castrated, he is called an *ox*, or *stot-calf*, until a yearling, and then a *steer*, until four, when he becomes an *ox*, or *bullock*. The cow does not assume that name until four years old, previous to which she is called, first a cow-calf, and then a yearling, two, and three years old *heifer*, or *quey*.

Of the Bull.

In the preceding chapter, some general remarks on the purchasing of cattle have been made, and a few characteristic features have been pointed out, in order to assist the young adventurer in this branch of rural economy. But, as the *male* of every species is the principal in the breed and generation, it will not be useless to give an account of that form or shape which is so essential to the constituting of a perfect animal.

A bull, then, ought to be the most handsome of his kind; he should be tall and well made; his head should be rather long, but not coarse, as fineness of head indicates a disposition to fatten; and, as it is designed by nature to be the chief instrument both of offence and of defence, it ought to present every mark of strength;† his horns clean and bright; his large black eyes lively and protuberant; his forehead broad and close set, with short, curled hair; his ears long and thin, hairy within and without; muzzle fine; nostrils wide and open; neck strong

and muscular, not incumbered with a coarse, wreathy skin, but firm, rising with a gentle curve from the shoulders, tapering to the part where it is connected with the head; dewlap thin, and but little loose skin on any part. His shoulders should be deep, high, and moderately broad at the top; the bosom open; breast large, and projecting well before his legs; back straight and broad, even to the setting on of the tail, which should not extend far up the roof, but be strong and deep, with much lank hair on the under part of it; ribs broad and circular, rising one above another, so that the last rib shall be rather the highest; the fore thighs strong and muscular, tapering gradually to the knees; the belly deep, straight, and also tapering a little to the hind thighs, which should be large and square; the roof wide, particularly over the chine and hips; or hooks; the legs straight, short jointed, full of sinews, clean and fine boned; knees round, big, and straight; feet distant one from another, not broad, nor turning in, but easily spreading; hoofs long and hollow; the hide not hard, or stubborn to the touch; the hair uniformly thick, short, curled, and of a soft texture; and the body long, deep, and round, filling well up to the shoulder end into the groin, so as to form what has not improperly been termed a round, or *barrel-like* carcass.

The bull attains the age of puberty generally at the end of from twelve months to two years; but it has been thought advisable to restrain him from the propagation of his species until he has arrived at his full growth, which is about four years; for, if this animal be suffered to breed earlier than three years, the stock is liable to degenerate. It must, however, be admitted, that a contrary opinion prevails among many eminent breeders; who maintain that the bull is in his full vigor at eighteen months old, at which age his progeny will display the most strength; and a prominent instance in point has been adduced in the practice of Mr. Vandergoes, of the Hague, who is reported to have had the finest stock of dairy cows in Holland, and who attributed the excellence of his breed to his using none but young bulls, which he always sold at three years of age. Others again contend, that the offspring of a bull, if well bred, becomes generally better until he reaches seven or eight years, and indeed, until his constitution is impaired by age.* Nor ought more than twenty cows to be allotted to one bull, or this animal be permitted to serve more than two cows in one day; for, although the cupidity of persons who hire out bulls, very generally exposes them to much greater trials of strength, it yet exhausts them, and they can no longer be depended upon as sure getters of stock; nor will the stock, if produced, be of equal vigor as when the number of cows is limited.

The bull, as well as the cow and ox, generally lives about fourteen years; but the progress of decay is usually perceptible after he has attained the age of ten. His temper is naturally fierce and ungovernable, which is not a little increased by his being usually permitted to live quietly in the best pastures, without being applied to any useful purpose but that of propagating his species. Hence this animal, naturally vicious, often becomes so mischievous as to endanger many valuable lives, an evil which, we conceive, might be remedied by

* Culley on Live Stock, pp. 208, 209.

† The Ayrshire dairy farmers, however, who pay very close attention to the perfection of their breed, prefer their dairy bulls according to the feminine aspect of their heads, necks, and fore-quarters; and wish them not round behind, but broad at the hook-bones and hips: they also like those best that are full in the flank.—Aiton's Dairy Husbandry, p. 27.

* See Sir John Sinclair's Code of Agriculture, 2d. Edition 1821, p. 108.

training him to labor; for, we doubt not but if he were moderately worked, and allowed to indulge his desires during the breeding season, he would become gradually tame, and harmless as the horse or any other often naturally vicious animal. Several experiments, indeed, have been made for this purpose; and, from their successful result, we think the practice of working bulls may be advantageously adopted; especially as these animals are not only broken in with little difficulty, and work well;

but also because they recover from fatigue much sooner than the ox.

For the prevention of accidents from mischievous bulls, an ingenious and simple contrivance has been suggested by Mr. Nicholls, of Woodhall, near Wisbeach, on whom the Society for the Encouragement of Arts, in 1815, conferred a premium of ten guineas, for the invention. Of its form and application the following engravings will convey a correct idea.

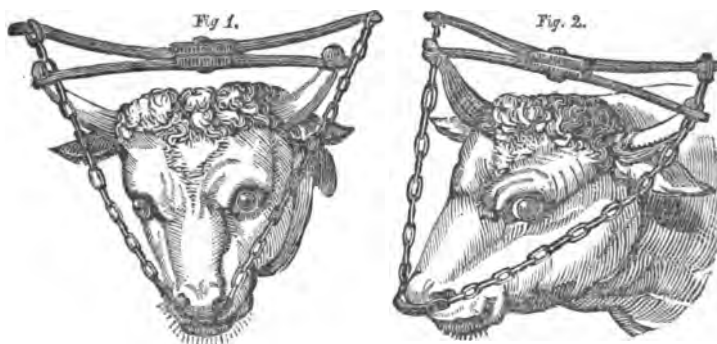


Fig. 1. Represents a *front* view of the apparatus, as affixed to the head of the animal. It consists of a straight piece of wood or iron (the latter is the preferable material) stretching from horn to horn, perforated at each end so as to pass over the tips, and fastened on them by the usual metal nuts. On the centre of this is riveted a curved bar of iron, bending upwards, which moves easily on the rivet, and has holes at each end containing the upper round link of a chain. These chains again unite in a strong iron ring, which opens by a hinge and screw, and passes through the bull's nose. The effect of this contrivance is as follows:—any person seeing a vicious animal approach may easily avoid him; but if the beast should make a push *forward*, the curved iron bar will prevent any bad consequences; and if he move in the smallest degree to the *right* or to the *left*, the bar communicating by the chain with the ring upon his nose, will bring him immediately to check. This *lateral* operation is delineated in Fig. 2. An additional advantage resulting from the use of this invention is, that a beast may, with the smallest power, be led in any direction.

Of the Cow.

A perfect breeding cow ought to have a fine head, with a broad, smooth forehead; black eyes; clean horns; a smooth, elastic skin; a large deep body; strong, muscular thighs; a large, white udder, with long and tapering teats, together with every other token requisite in a bull, allowing for the difference of sex, to which we may add, as a general remark, in the words of a skilful dairyman (although his observation was only applied to a particular breed) that, the symptoms of a good milker are “a large thin-skinned udder; large milkveins; shallow and light fore-quarters; wide loins; a thin thigh; a white horn; a long thin head; a brisk and lively eye; fine and clean about the chaps and throat.”* Further, such animal ought particularly to be young; for milch kine are not good

for breeding after they are twelve years old, though they will often live a much longer time if their pasture be good, and they be kept from diseases.

Cows are purchased either with a view of being fattened for sale, for breeding, or for the purposes of the dairy. In the former case, it will be advisable to attend to the kindliness of their skins, and disposition to fatten; with regard to those which are intended for breeding, care should be taken to select the best of that particular stock intended to be raised; and for the dairy, those which yield the most, and the richest milk: a subject which will be treated more at large under that head.* The desirable qualities of a dairy cow are, that she should give an abundant supply of milk; fatten readily; and turn to good account in the shambles; but, in fact, those beasts which yield great quantities of milk, seldom fatten quickly, and repeated unsuccessful efforts to unite these two irreconcilable properties, have proved that the different breeds of neat cattle have not hitherto been brought to entire perfection. There is, it is true, a middling kind of cows, which give a tolerable quantity of milk, and also keep in pretty good condition; but, though many of this sort will become very fat when they are dried, or their milk is taken from them, yet they will not fatten so speedily or so well as those which yield a less portion of milk, and which are more kindly disposed to fatten while they are in a milking state.

As, however, the dairy constitutes, in many parts of the kingdom, an object of great importance, it is a point worthy of the most deliberate discussion, whether a particular breed ought to be kept for that purpose only, or whether it be preferable to have stock calculated partly for the butcher, and partly for the dairy. “It is probable,” observes Sir John Sinclair,† “that, by great attention, a breed might be reared, the males of which might

* Book II.

† Hints regarding Cattle, inserted in the Farmers's Magazine, vol. iii, p. 156.

* Wedge's Account of the Cheshire dairy breed.

be well calculated, in every respect, for the shambles; and the females of which might, when young, produce abundant quantities of good milk; yet, when they reached eight or nine years of age, might be easily fattened. This," he justly remarks, "would be the most valuable breed that could be propagated in any country; and, indeed, some of the best English and Scottish breeds have almost reached that point of perfection." Nor would the attainment of that object be improbable, if more attention were paid to use bulls from the best fattening stock with the best milch cows.

The cow is supposed, by some eminent naturalists, to arrive at puberty at the end of eighteen months, though instances have occurred where these animals have produced calves before that time. It is, indeed, said by some breeders, in the northern part of this island, that young cows may be sent to the bull as early as even *one year* old; but there is then much danger in calving; and although the practice would certainly be an essential improvement where the dairy constitutes a primary object, provided their growth would not thus become stunted, it is yet generally considered injudicious. It besides often happens that when such young heifers fall in calf, they miss in the following year, and thus nothing is gained in stock, while to the animal itself, it is evidently injurious. It is, therefore, advisable not to permit cows to take the bull earlier than two years, though many breeders defer it another year; and, in conformity to the latter opinion, the late eminent Mr. Bakewell deferred sending his cows to bull till they were three years old; they, however, often missed calf, which accident Sir John Sinclair attributes to this circumstance. The most proper period must in some measure depend on the breed, on the time at which the heifer was herself dropped, and on her condition; as some which have been well kept will be more forward at two, than others, which have been stunted, at three years of age.

An idea formerly prevailed, and is not even yet entirely exploded, that the best mode of improving stock, of every description, was to choose males of the largest size. The consequences, however, have generally been a great increase of bone without any corresponding improvement in other qualities, and such an incongruity of shape as evidently denoted a mongrel breed. The most judicious method is, to employ males of superior shape but yet of a moderate size, and to couple them with females nearly as large, if not larger. The nearer the other qualities of both approach to perfection, of course the better will be their progeny; but it is material that, even in their best points, there should not be too great a disparity: gradual improvements will always be followed by certain ultimate success; while violent attempts to effect a sudden change generally disappoint expectation.

The most advantageous time, in general, for a cow to take the bull is, from the commencement of May till the middle or close of July, so that she may calve in January, and thence forward till March or April. And as it is, in most places, a matter of considerable importance to have a uniform supply of milk throughout the year, we conceive it would prove a source of profit to a farmer, possessing twelve, or any large number of milch kine, so to arrange the circumstance of breeding as to have three or more cows dry at one time.

The period of time during which cows are al-

lowed to *run dry* previously to calving, is by no means settled. By some graziers they are recommended to be laid dry when they are about five or six months gone with calf; but repeated and successful experiments prove, that six weeks or two months are sufficient for this purpose; indeed, cows kept in good condition are sometimes drawn until within a fortnight of calving; but this is a practice not to be recommended; for if the cow *springs* before she is dry, serious injury may ensue.

The *symptoms of calving* are a distension, or springing, of the udder, and gradual yielding of the ligaments of the couples, or rump-bones, as well as an increased leanness between the shape and the udder, all of which are generally perceptible about a fortnight before the cow is at her full time; when that arrives it is marked, first, by a slight elevation of the tail, and then by general uneasiness until the pains commence.

In general, the cow *conceives* after once taking the bull; but, if she should chance to fail, she should go again to bull within three weeks after. To prevent, however, this accident, it will be advisable, as soon as convenient after her return home, to throw a pailful of water on her udder behind, and to keep her that night separate from any others: for it not unfrequently happens that cows (after taking the bull) will ride each other; in consequence of which they are apt to misconceive, and it is also supposed that, when they have acquired that habit, the quantity of milk they yield is thereby greatly diminished.

The desire of having a frequent supply of calves has induced many to have recourse to *artificial means*, in order to induce cows to take the bull; a measure which cannot be sufficiently deprecated, for the most efficacious mode of obtaining this object undoubtedly consists in keeping them in good heart; in consequence of which nature will predominate over the animal's body, and cause it to show signs of procreation through the medium of the creature's constitutional feelings. When it has been resorted to, one of the most effectual means has been found to give a couple of quarts of milk, warm from a cow in season, but before she has taken the bull, and in a few days it has taken effect. The time when a cow is *in season*, is known by her restlessness, by her riding on other cattle; and by the inflamed appearance of the external parts, accompanied by a discharge from the vagina. These symptoms only continue for three or four days, sometimes not so long, and do not return for a fortnight or three weeks; and when conception has taken place they disappear.

The *period of gestation*, or time during which the cow goes with calf is various: with a bull calf, she usually goes about forty-one weeks, with a difference of a few days either way; a cow calf comes in less time. Between nine and ten months, therefore, may be assigned for the period of gestation; at the end of which time she produces one calf; though instances sometimes occur when two, or even three, are brought forth. It may not however be useless to remark, that some cows are naturally *barren*, which is said to be the case when a male and female calf are produced at the same time. The male animal is perfect in all respects; but the female, which is denominated a *free martin*, is incapable of propagating her species; it does not vary very materially, in point of form or size, from other neat cattle, though its flesh is errone-

ously supposed to be greatly superior in flavor and fineness of the grain.

Some very interesting experiments, respecting the periods of gestation in different animals, were made a few years ago by M. Teissier, of the Society for the Encouragement of Arts, at Paris; from which it appears, that out of 575 cows,

21 calved between the 240th and 270th day; mean term 259½

544	270th	299th	282
10	299th	321st	303

Thus, between the shortest and the longest gestation there was a difference of eighty-one days, which is more than one fourth of the mean duration.

As cows are very subject to *abortion*, when improperly treated during gestation, they ought to be observed with more than ordinary care through the whole of that period, lest they should leap ditches, &c., and on no account should they be suffered to draw in the plough or other carriage, which is the practice in some countries. For about a month or six weeks before the time of calving, it will be advisable to turn the cow to grass, if in the spring; but if it happen in the winter, she should be fed with the best hay, and some turnips, potatoes, carrots, or other winter fodder, or with a mixture of bran and oat or bean meal, to which grains may sometimes be added; or, should these not be at hand, the mere boiling of a portion of the hay, and giving it along with the water, when cool, will be found to keep her body in a healthful state for calving, and also to improve her milk. It is not proper that she should be made fat, because the fatter a cow is, the less milk is given; and yet, if she be too poor, there is danger lest she should fall in calving.

When the term of gestation is nearly complete, the animal should be kept apart from other cattle, in a quiet close, near the homestead, in order that she should be under constant observation, and that assistance may be ready in case of a difficult birth; and, as the final period approaches, attention should be paid to keep her bowels open, by means of laxative drinks. If the cow should be so much exhausted in calving, as that the throes are not sufficient to produce the birth, she should occasionally have a drink of two or three quarts of gruel, and a pint of ale, which will give her strength to make further efforts to get rid of the calf, and will also assist the operation. Cows sometimes calve in a recumbent posture, and care should be taken that the place where they lie down is not on a steep descent; for in that case, the calf is apt to be brought prematurely forward, and, by the straining and irritation it produces, a tedious, and sometimes dangerous calving is occasioned. But, on the contrary, when the act of calving has actually commenced, the operation is aided by the animal being laid on a descent.

The day and night after a cow has calved, she is usually kept in the house, and allowed tepid or lukewarm water only for her drink. The propriety of this practice has, however, been questioned, and some eminent breeders are of opinion that housing, unless in very chill, or wet weather, is unnecessary; and that cold water is better than warm. On this we may observe, that the more nature is left to direct her own operations, the better; yet there can be no doubt that, in particular

instances, she may be aided not only without injury, but with advantage: perhaps, therefore, in very fine weather, all that may be necessary will be to watch the cow attentively, lest she should require aid, but not to use any artificial means unless she may evidently need assistance. In cold weather, there can be little doubt that it is most advisable to house her, and not only to take the chill off the water, but to allow her some gruel. On the day following she may be turned out about noon, and be regularly taken in during the night, for three or four successive days. The animals thus housed should be kept till the morning cold is dispersed, previously to their being turned into the field, otherwise a premature exposure to the damp atmosphere cannot fail of greatly weakening them.

The hints above stated are given on the supposition that the cow is well, no difficulty having happened during the time of calving; and that she has not *slipped*, or *cast her calf* before its full time. It should be observed, that the proper position of a calf, while in the uterus, is with its fore-feet and head foremost, its back being towards the cow's back, and its two fore-feet lying parallel to the sides of its head. When the fetus appears in any other manner, it is termed an *unnatural position*; and the extraction of the calf, under these circumstances, requires the utmost steadiness and dexterity; as, however, no instructions can be adequate to every possible case, it will always be necessary where this event is apprehended, immediately to apply to some expert cow doctor, lest the loss of a valuable animal should be the consequence of injudicious treatment. During this painful operation, particular attention should be given that the pudendum, or *baron*, as it is sometimes called, be not lacerated or torn; should this, however, take place, the part must be sewed gently up; and, if it be swollen, it ought to be washed with lukewarm milk and water.

But, where a cow slips, or casts her calf prematurely, she must be tended with great care; and, whatever may be the cause, whether abusive treatment, violent exercise, bruises or blows, or that unnatural appetite known by the name of *longing*, every animal that has slipped her calf should be carefully separated from the rest of the herd.* Cleanliness, which is an essential requisite in the general management of cattle, ought in this instance to be an object of special attention; and, as cows which are liable to drop their calves usually evince some preparatory symptoms between the cause of the abortion and the actual slipping of the fetus, it will not be altogether useless to bleed them two or three times, as this expedient has sometimes operated as a preventive.

After, however, the calf is produced, it will be necessary to assist the natural functions of the ani-

* This latter direction should be scrupulously attended to; for, however extraordinary it may appear, repeated experience has proved that the disease is infectious. Various reasons have been assigned, but none satisfactorily account for it; though it appears to be occasioned by some peculiar odor issuing from cows which are thus affected: the fact, however, having been ascertained, should be guarded against. It is also worthy of remark, that cows which have once slipped a calf are more liable than others to a recurrence of miscarriage.

mal, in order to carry off the *secundines*,* provided in the uterus for nourishing the fetus; and which, continuing there, in consequence of abortion, would become putrescent, and thus occasion a disagreeable odor that would quickly communicate an infection among other breeding cows. For this purpose we would, at all times, recommend the following mixture to be given to the cow, as soon after calving as possible: let about three quarts of water simmer over the fire; and, when warm, strew in as much oatmeal as will be sufficient to make a strong gruel, carefully stirring the whole till it boils, that no lumps may arise; then add one quart of ale (or two of table beer) and one pound of treacle, and carefully incorporate the different ingredients by stirring. This mixture should be given lukewarm: it is peculiarly grateful to cows, which will drink it eagerly, after the first hornful, and are thus prevented from taking cold; and, as it is of importance to regulate the state of the body, this object may be effected by giving a warm bran mash; but this treatment only applies to animals that are housed.

It will be necessary to milk the cows, especially if they be full of flesh and the udder hard, three or four times a day, for two or three days, and the calf should be suffered to suck as frequently, if in the house; or, in the field, to run with her, and suck at pleasure; care being taken to observe that the mother does not prevent it; for, if the udder or teats be sore, she will naturally be averse to suckling, and danger is incurred of losing both animals: and, in case the kernel of the udder is hard, the hardness may be removed by rubbing it three or four times in the day.

The falling down of the calf-bed is a serious accident, which sometimes occurs after a laborious birth, when the cow is more than usually fatigued, although some beasts are naturally disposed to such weakness. Where the falling down of the calf-bed is apprehended, the cow ought to be carefully watched; and the placenta, or cleansing, should be removed, if possible, without effusion of blood; after which the operator may gently replace the calf-bed, taking care not to withdraw his hand till the former begins to feel warm. The following draught may then be given: let bay-berries, pulverized gentian root, and coriander seeds, of each one ounce; aniseeds and juniper berries, of each two ounces; and half a pound of treacle, be given in three pints of good strong beer; after which lead the cow gently down a hill, if there be one adjacent, as the motion will greatly contribute to replacing the calf-bed in its proper position, and render the application of stays to the womb unnecessary. Where beasts have a peculiar construction, favoring this malady, it may possibly be prevented when the period of gestation is nearly expired, by extending their stalls so as to favor their lying down; but where the calf-bed comes down, and no immediate aid can be procured, it should be deposited on and covered with a clean linen sheet; the

* Or afterbirth, sometimes termed the cleansing. Cows will often eat this excrement with avidity; and to prevent that, it is generally removed: but it is to be doubted whether this practice is judicious, for nature seems to have provided this substance as a medicine for the animal, which may be requisite at the time, and its being eaten is never known to be prejudicial to its health.

irritation thereby produced being considerably less than that of the air, litter, &c.; and when it is replaced, those parts which have been so exposed should be bathed with new milk and brandy, rum, or spirit of wine, after which the treatment above mentioned may be pursued.

After calving, the cow should not be permitted to take the bull until four or five weeks have elapsed, although she should show symptoms of coition sooner—as the womb is before that time in so relaxed a state as seldom to admit of conception.*

[To be continued.]

CULTIVATION OF THE UNITED KINGDOM.

From the Quarterly Journal of Agriculture.

The following statement will be found interesting, as exhibiting the number of acres in cultivation in the United Kingdom, and the different purposes specified, for which there are employed in England and Wales; as well as the number of farms, and the annual amount of property derived from agriculture:

	Cultivated Acres.	Uncultivated wastes incapable of improvement.	Barren and unprofitable.	Total.
England	25,632,000	3,454,000	3,256,400	32,342,400
Wales	3,117,000	530,000	1,105,000	4,752,000
Scotland	5,265,000	5,950,000	8,523,980	19,738,980
Ireland	12,525,280	4,500,000	2,416,664	19,441,944
British Isles,	383,690	166,000	569,469	1,119,159
Total	46,922,970	14,600,000	15,871,463	77,394,433

The number of farms in the United Kingdom is estimated at 2,000,000 and the property annually derived from agriculture in Great Britain and Ireland at £215,817,624.

In England and Wales it is calculated that there are—

Acres in the Kingdom	Use
3,250,000	Wheat.
1,250,000	Barley and Rye.
3,200,000	Oats, Beans, and Peas.
1,200,000	Clover, Rye, Grass, &c.
1,200,000	Roots and Cabbages by the plough
2,100,000	Acres of Fallows,
47,000	of Hop Grounds.
18,000	of Pleasure Grounds
17,300,000	depastured by Cattle.
1,200,000	of Hedge Rows, Copse, and Woods.
1,300,000	of Ways and Water-Courses.
5,029,000	Common and Waste Lands.

37,094,000 Acres.—Total of England and Wales.

Consumption of wheat and other grain in the United Kingdom, in a year, six months, a month, a week, &c.

	Wheat, Quarters.	Other Grain, Quarters.	Total Quarters.
A year - -	12,000,000	40,000,000	52,000,000
Six months - -	6,000,000	20,000,000	26,000,000
Three months - -	3,000,000	10,000,000	13,000,000
Six weeks - -	1,500,000	5,000,000	6,500,000
One month - -	1,000,000	3,333,333	4,333,333
Two weeks - -	500,000	1,666,666	2,166,666
One week - -	250,000	833,333	1,083,333
One day - - -	85,714	119,048	154,762

* See Skellett on the Parturition of the Cow; which contains much valuable information on the subject of difficult births.

CLIMATE OF VIRGINIA.

To the Editor of the Farmers' Register.

Braynesfield, Caroline co. Va. July 8, 1834.

Revolution has not been confined alone to man. Nature is deeply marked with the footsteps of its caprice. The sea now murmurs over the ruins of imperial Carthage—*islands spring into life from the bosom of the ocean—the relics of a gigantic race both in the moral and physical world are wide scattered over the hills and valleys of our western country, and though we believe the world to be old, it has existed but as a day in the march of nature, and we but as the restless pilgrims of an hour. Philosophy may tremble at the grandeur of the scene, while wisdom is left to gather light from the feeble glimmerings of its own brief experience.*

All climates have felt the power of this controlling agent, and from a series of latent and visible causes, most of them have become radically changed. In the annals of that clime of the vine and the olive, Palestine, we have the testimony of holy writ to prove the severity of its winters—

"The waters are hid as with a stone, and the face of the deep is frozen." Job xxxviii. 30.

"He giveth snow like wool. He scattereth the hoar frost like ashes. He casteth forth his ice like morsels. Who can stand before his cold?" Psalms cxlvii. 16, 17.

The cloudless sky of Italy owes most of its boasted glory to the favoring influence of this change. In the Georgics of Virgil we find the young husbandman advised to protect his stock from the injurious effects of ice and from "*glaciem ventosque nivales*," while Horace often writes like a sea-coal poet, borrowing his inspiration from a cheerful fire, and his boldest metaphors from the terrors of winter. Cæsar* and Juvenal frequently allude to the existence of severe cold; and Ovid in his unmanly wailings from the shores of the Euxine, tells us that oxen and carriages passed over that sea on the ice—that wine was presented to him congealed, and that the snows of winter were not dissolved until the ensuing summer. The countries of Europe and Asia whose history is familiar to us from the recollections of youthful study, are all characterized by the same gradual amelioration of climate, and we may safely assert that every extension of agricultural improvement produces a gradual decrease of cold, of half of a degree to each progressive century. From the philosophical tables of Kirwan, it will appear that the several places in Europe at which his observations were made, possess twelve degrees more of heat, than American provinces lying in the same parallel of latitude. This result cannot be sustained by a comparison drawn from the earlier days of Europe, and we may fairly conclude that the increase of population in that country, and its exchange from the pursuits of hunting and feudal war, to the clearing of forests, and the improvement of land, in giving to the earth a greater facility to retain heat, has produced a corresponding mildness of temperature.

* In the time of Cæsar the reindeer, elk, and wild bull were natives of the Hercynian forest, which overshadowed a great part of Germany and Poland. The two former are now found only in extreme northern latitudes.

At the discovery of our continent it presented an immense forest untouched by human labor. The majestic rivers of the new world, swelling by every shower, inundated the whole country, and left in their track numerous marshes and extensive lakes. The woods were hid with rank luxuriance, while the exuberant undergrowth of herbs, shrubs, and weeds, gave to the prospect that gloomy and repulsive solitude which was so aptly described by the first settlers as *the wilderness*. The earth could not retain the heat of the sun, nor could this effect be produced by the mass of foliage. The air stagnated in the forest. Offensive exhalations arose from the numerous marshes, and the accumulated decay of vegetation, while the whole land was rife with the pestilence of malaria.

We cannot always arrive at definite conclusions of the climate of any country by barely measuring its degrees of distance from the equator. Its character is controlled by many other direct causes. Extent of territory—nature of soil—height of mountains and elevation above the sea, greatly affect it. The extent of our northern seas, with the ice which continues there from year to year, gives to every wind which blows over them an intense cold. A chain of gigantic mountains spread their snow-capped summits throughout the heart of our continent. The winds which blow over them become deeply surcharged with cold, whose piercing severity is not diminished until it has extended far down upon our southern sea coast. Our daily experience attests the truth of this fact, for who in Virginia has not been chilled by the duration of a north west wind, or even its sudden shifting to that point?

The climate of Virginia has not been stationary in this revolution of nature, but has rapidly advanced in the van of its progress. To trace its characteristics is to follow the varying passions of the coquette—now enticing by seductive smiles—and now chilling by capricious frowns. Yet it is the clime under whose genial influence we have been bred, and we can easily forget its vicissitudes in the glittering canopy of life and beauty which it throws around every scene. Those who have dwelt amid the sunny clime of Italy—the fierce heat of Spain, and the elastic air of France, can appreciate from the test of comparison, the softness of a Virginian day—and how splanetic soever we may be, it never has gloom enough to make us "damn it as a lord."

Captain John Smith in his faithful and spirited History of the Colony of Virginia, makes many allusions to its climate, and with a proper allowance for his zeal in coloring the advantages of a settlement in the colony, we may receive his statements as the honest opinions of a careful and accurate observer.

"The sommer (says he) is hot as in Spaine, the winter cold as in France or England. The heate of sommer is in June, July, and August, but commonly the cool breezes assuage the vehemency of the heate. The chief of the winter is halfe December, January, February, and halfe March. The cold is extreme sharpe, but here the proverbe is true "that no extreme long continueth." Sometimes there are great droughts, other times much raine, yet greater necessitie of neither, by reason we see not but that all the raritie of needful fruites in Europe may be there in great plentie by the

industrie of man."* In an earnest appeal to the friends of the colony, he again recommends it for the "mildnesse of the ayre and the fertilitie of the soyle."†

This sketch of the colony is studiously silent as to the existence of marshes, though much of the ill health of the first emigrants, may be traced to them.‡ In giving an account of the bays, rivers, and brooks, our author incidentally remarks that "by the rivers are many plaine marishes containing some twenty, some one hundred and some two hundred acres. But little of grasse there is but what groweth in low marishes."§ In the advance of population and agricultural improvement, these marshes were gradually reduced. Mr. Nathaniel Caussey who had lived in Virginia with Capt. Smith, states in the year 1627, "that whereas the country was heretofore held most intemperate and contagious by many now they have houses lodging and victuals and the sun hath power to exhale up the moist vapours of the earth where they have cut down the woods, which before it could not, being covered with spreading tops of high trees, they find it much more healthful than before."¶ Captain Butler a gallant pioneer of the new world, and at one time governor of Bermuda, on his return to England from Virginia in the year 1624, presented to Charles I. a pamphlet entitled, "*The unmasked face of our colony in Virginia as it was in the winter 1622.*"§ In this work he draws a lamentable picture of the struggles of the infant colony, and asserts "that the English plantations are generally seated on marshes, lakes, and infectious bogs which have subjected the planters to the inconveniences and diseases prevalent in the most unhealthy parts of England."*** This pamphlet excited much hostility against the Virginian Company, which was artfully fermented by Charles I. who was then secretly planning the ruin of that noble and patriotic association. Some of the members of the company who had been in Virginia united in an address to the public, in which they state "that they had found the air of Virginia to be as wholesome and the soil for the most part as fertile as in any part of England."†† The House of Burgesses in a curious memorial of resentment, ill humor, and personal sarcasm, pronounced the charges of Capt. Butler to be false and slanderous, and informed the king "that no bogs have been seen here, by any that have lived here twice as many years as Capt. Butler did weeks in the country—the places which he so miscalls being the richest parts of the earth, if we had a sufficient force to clear their woods and to give the fresh springs which pass through them a free passage. The soil is generally rich and restores our trust with abundance. The air is sweete and the clime healthful, all circumstances considered, to men of sound bodies and good government."‡‡

* Same, 114. † Same, 128.

‡ In the reply of Gov. Berkeley to the enquiries of the Lords Commissioners of Foreign Plantations, in 1671, he states "that all new plantations are for an age or two unhealthy, until they are thoroughly cleared of wood." 2 Hen. Stat. at Large, 515.

§ Smith's History of Virginia, Vol. II. 115, 121.

¶ Same, 258.

§ Stith calls it a "starch and affected title."

*** Stith's History of Virginia, 278. †† Same, 291.

‡‡ Stith, 308.

In 1624 the Virginian Company in petitioning parliament for encouragement and protection, earnestly recommended the colony "for that temperature of climate which agreed well with the English."* Smith often makes similar comparisons, and it is evident from the writings of our earliest historians, that the climate of Virginia differed but little from that of England. The immense mass of vegetation which overshadowed the country, filled it with fogs and vapors, assimilating it to that of England, and rendering it extremely cold in its winters, and tardy in its summers. It was less affected by the standard temperature of the sea than England, and was marked with more striking vicissitudes. The cold winter of 1607, which was felt throughout all Europe† was, in the language of Smith, found "as extreame in Virginia." There were also many unseasonable years, and others singularly propitious to the agriculture of the country. The year 1610 was long recollected by the epithet of *the starving time*, while in the year 1619 two crops of rare ripe corn were made.‡ Among many of the acts of the House of Burgesses regulating the trade of the country, we find one which prohibits the exportation of Indian corn, "on account of the unseasonableness of the last two summers."§

As the country was gradually cleared of its forests and undergrowth, the climate became dry, temperate, and warm. The act of the House of Burgesses of 1705, which directed the capitol to be built at Williamsburg recites, "that this place hath been found by constant experience to be healthy and agreeable to the constitutions of this his majesty's colony and dominion, having the natural advantages of a serene and temperate air, and dry and champaign land."¶ A correspondent to the Royal Philosophical Society, who wrote an account of Virginia about this period, says "that the winters are dry and clear—the spring is earlier than that of England. Snow falls in great quantities, but seldom lies above a day or two, and the frosts, though quick and sharpe, seldom last long. July and August are sultry hot, while September is noted for prodigious showers of rain. The north and north west winds are either very sharp and piercing, or boisterous and stormy, and the south east and south hazy and sultry."

From the want of accurate observations, and those careful collections of meteorological facts which elucidate the character of all climates, our speculations on that of Virginia must be necessarily vague and indefinite, and for the nicer shades of its changes, we are forced to substitute the broader features of its outline. Our climate is uniform only in its sudden vicissitudes. Its consistency is impaired by many causes, which have produced a difference of temperature dependant on the deeply marked geographical distinctions of our sea board, tide water, valley, and mountainous regions. My observations have been principally confined to that intermediate country, between the Chesapeake and the South West Mountains, on the low and moist lands of the Mataponi, in latitude north 38° 6', and about seventy miles south of Washington City. While I am forced in my

* Stith, 325.

† In this year at Paris the beard of Henry IV. was frozen in bed *cum regina*. Sully's Mem. Vol. IV. 262.

‡ Stith, 162. § Hen. Stat. Large, Vol. III. 185.

¶ Hen. Stat. at Large, Vol. III. 410.

examination of the temperature of the other parts of the state, to rely on statements often inaccurate in their conception and irrelevant in their details.

The standard temperature of every country is regulated by that of the level of the ocean. According to the researches of Professor Leslie, the mean temperature at the level of the sea, in our latitude is between 67° and 71° degrees, which gradually diminishes from that level, until it reaches the point of perpetual congelation. Pure air is not heated by the sun's rays which pass through it; the solar rays must be stopped by the earth, collected and reflected before any heat can be given to the atmosphere. In taking a standard, we assume the sea, which affords a fairer criterion of uniform temperature, than the mean heat of springs and wells. Neither does the sea retain the extreme of heat or cold which we find in the earth. A cold wind blowing over this volume of salt water, necessarily cools its surface, which from its increase of specific gravity, sinks and gives place to an inferior warmer wave. The action of the wind in rippling the surface of the water, and the influence of tide and currents conspire in bringing the warmer water to the level of the sea to mitigate the coldness of the wind: this action continues till the whole water is so far cooled that it becomes susceptible of frost. When frozen it is no longer warmed from the inferior water, but blows on with increased rigor. A warm wind takes a portion of cold as it passes over the surface of the sea, and becomes reduced to the mean temperature of that body. The sea breeze so prevalent in Eastern Virginia is cool as much from the standard heat of the ocean, as from its rapidity of motion: it is cooler in Virginia than in the West Indies, and often since the opening of the country, spreads its elastic freshness to the foot of the South West Mountains. There is a sensible and striking difference between the temperature of Eastern and Western Virginia. The former from its vicinity to the sea coast, becomes tempered into more gentleness; while its earlier vegetation shows the greater power of its soil to retain heat. In the latter, the winters are longer and more severe, yet the farmer may there admire the wisdom of that providence, which in increasing the rigor of the frost, mellow and crumbles the land for the purposes of agriculture, while the light soils of the east require no such agency.

In the course of five years, from 1772 to 1777, Mr. Jefferson made many observations on the temperature at Williamsburg, and having reduced them to an average for each month in the year, he has given us the results of the greatest daily heat of the several seasons.* I have before me a series of careful observations compiled by that accurate thinker, and accomplished scholar, the late David Watson, (of Louisa County) in a similar period of five years, from 1823 to 1828. His residence was near the South West Mountains, and in a country comparatively thickly covered with wood. The result of his observations and those of Mr. Jeffersons, making a distance in time of 52 years, and of southern latitude in favor of Williamsburg, is here submitted.

* Notes on Virginia, Query 8.

Mr. Jefferson's.

January,	38½°	to	44°
February,	41	to	47½
March,	48	to	54½
April,	56	to	62½
May,	63	to	70½
June,	71½	to	78½
July,	77	to	82½
August,	76½	to	81
September,	69½	to	74½
October,	61½	to	66½
November,	47½	to	53½
December,	43	to	48½

Mr. Watson's.

January,	36	to	44
February,	35	to	40
March,	44	to	49
April,	58	to	60
May,	61	to	69
June,	71	to	79
July,	80	to	84
August,	81	to	84
September,	74	to	77
October,	59	to	63
November,	46	to	54
December,	40	to	44

The coolest and warmest parts of the day were separately added, and an average of the greatest cold and heat of that day was formed. From the averages of every day in the month, a general average for the whole month was deduced. In following this mode of analysis, there are many slight features of discrepancy between the statements of Mr. Jefferson and Mr. Watson, which considerably impair the correctness of the comparison. Mr. Watson's thermometer was suspended in a passage, far removed from the action of fire, in a house constructed of wood; and the calculation of his table is based on observations made between the hours of 10 A. M. and 3 P. M. Mr. Jefferson is silent as to the situation of his thermometer, while it appears that he has reckoned from the hours of 8 A. M. to 4 P. M.

The hottest period of these five years, observed by Mr. Watson, was in July 1825, when the thermometer on several days rose above 90°, and the hottest month was in August 1828. The coldest period was during the month of January 1827, and the warmest winter was in 1828—29.

My own observations made during a period of four years, from 1829 to 1834, cannot be calculated for an average temperature. Many days and even months from my absence from home, were necessarily unnoticed. Those periods which are recorded differ but little in their particular and daily results, from those of Mr. Watson; while I have noticed his singular omission—the prevalence of the winds, and the "fantastic tricks" with which our climate so playfully disports. From my observations, I am induced to place the mean temperature of our climate at 55°; thus varying according to natural and artificial causes several degrees from the standard temperature of the sea.

The year 1831 was characterised by many vicissitudes of heat and cold. On the 27th February the mercury sunk to 7°, while in July and August it frequently rose to 86° and 94°. The ensuing winters of 1831 and 1832 was uncommonly rigorous, snow fell in great quantities, and in many

places continued on the ground till the 4th of March. Early frost did much injury to vegetation, while the cold was but slightly removed from the earth until late in the ensuing summer. The spring of 1834 was attended by severe frosts, which resembled in their destructive character, those which had rendered the year 1816 proverbial. They committed great devastations in April, and on the 15th, 16th, and 17th of May, the Indian corn on our low lands, and the leaves of the garden and forest trees were scathed and blighted to a degree precluding, in many cases, all hope of restoration.

In Virginia the transitions from heat to cold are sudden, and sometimes to very extreme degrees; often in the day time the mercury will stand at 94° or 81°, and will fall in the course of a few hours to 60° and 50°. Mr. Jefferson informs us that the mercury has been known to descend from 92° to 47° in thirteen hours. I have frequently noted vicissitudes of a similar kind, and when the change is accompanied by a south east wind and rain, the air becomes cold, raw and disagreeable. We have few summers in which a fire is not often required. On the 1st of May, 1827, there was a slight fall of snow at Gloucester Court House,* while it is not uncommon to see slight frosts in August. In our winter the cold weather, though severe is short, and the frequent snows of the night are generally removed before the sunset of the ensuing day. Water in ponds is slowly congealed, and rarely makes ice thick enough for preservation, until it has been chilled by a fall of snow—again, its production is very rapid; rivers half of a mile in breadth, will be frozen over in the course of one night, sufficiently firm to bear men and horses.† In the month of January, 1827, many of those short yet wide salt streams, which wash the shores of Gloucester county, were frozen to the extent of thirty or forty feet from the land. This rigorous cold is rarely of much duration, sustained, and principally created by north and north eastern winds, it quickly yields to the shifting of the wind to any other point. Some of our winters are so temperate and mild, that the cattle can find a support in the woods; vegetation has been observed in all the winter months, and in the latter part of December diminutive pears, peaches and apples, fully ripened, have been gathered from the trees. A rose exposed in an open garden bloomed throughout the whole winter of '28 and '29; in this winter the peach tree bloomed in the latter part of January, and produced in its regular season a plentiful crop of fruit. Many of our coldest days are succeeded by gentle and moderate evenings; our severest cold is about the latter part of January, generally commencing after a hard rain, and continuing on an average about six days, thus realising the truth of that old Virginian proverb, "that as the day lengthens the cold strengthens;" a rapid thaw, often accompanied with rain and east winds, then takes place, while

warm days and moderate nights soon reduce its severity, and open the way for the premature approach of spring. "Half of March" is no longer winter, spring has already scattered her vivid mantle o'er the scene, while the whole air is redolent of life and fragrance. Yet even its brightness is momentary—an unexpected frost often shows that the frown of winter still lingers on the land, and we too frequently find a practical illustration of Shakespear's metaphor,

"The tyrannous breathings of the north,
Checks all our buds from blowing."

It is now stormy, variable and cold; now calm, gentle and warm, and now dry, peaceful, and serene. Until the middle of May our climate presents one incessant tumult of rain and drought, frost and heat; yet a spring uniformly cold is far more favorable to our agriculture, than its usual uncertain temperature for suppressing vegetation, it protects it from the blighting frosts of March and April. Often during the spring months the weather is excessively damp, cloudy and hazy; in March, 1833, the sun was obscured for more than thirteen days, while every thing was chilled into gloomy melancholy.

The vegetation of this season affords us a criterion of the heat of the spring, which may be received in aid of the more accurate results derived from the thermometer. In the course of four years I have found these average periods of time sustained by careful observations:

Peach blooms from March 7 to March 14.
Apple blooms from March 20 to March 29.
Cherry blooms from March 13 to March 17.
Plum blooms from March 26 to March 31.
Strawberry blooms from March 24 to March 31.*

About the latter part of May our summer has commenced: the air becomes dry, warm and elastic, and the verdure of the forest assumes a more deepened hue of vivid green. The superabundant moisture of the earth acquired during the winter, is now thoroughly evaporated, and the temperature of the season in dispelling lassitude, invigorates into activity; summer burns on with a bright and glowing splendor, alternately relieved by gentle showers and refreshing breezes. Occasional droughts of many weeks in duration, parch the luxuriance of the vegetation; they are succeeded by copious and heavy showers of rain, which quickly restore the withered prospect. The approach of autumn is marked by heavy fogs in the morning and evening, which are soon dispelled, leaving that calm and serene temperature, which gives to this season all the beauty of tranquil repose. In every season there is a large and constant exhalation from the earth in the shape of vapor, its volume being proportioned to the heat of the day. We do not often observe this exhalation when the heat of the atmosphere differs in a small degree from that of the earth; when the temperature of the air is considerably lower, this vapor so soon as it has arisen is deprived of a part of its heat, while its watery particles are more

* Dr. Rush in his essay on the climate of Pennsylvania, mentions a fall of snow at Philadelphia on the night between the 4th and 5th May, 1774.

† Mr. Jefferson tells us that in 1776 York River was frozen over at York town, and in 1780, Chesapeake Bay was solid from its head to the mouth of the Potomac. The cold winters of 1784 and 1814 still live in the recollections of tradition.

* At the residence of R. G. Esq. near the Natural Bridge in the Valley of Virginia, these fruit trees in the year 1834, bloomed at the following periods:—

Peach	April 1.
Apple	March 30.
Plum	April 1.
Strawberry	April 15.

closely attracted into union and become visible in the shape of fog. In the autumn of Virginia, the heat of the day is sufficient to produce a large ascent of vapor. Undisturbed by currents of wind it easily condenses, and is thickened by calm and chilling nights into a heavy mist, which in the guise of a cloud finds its resting place on the earth. Autumn of all other seasons, is least liable to sudden and extreme vicissitudes. The approach of winter is alike gradual and uniform, and though we have frequent light snows, its mildness is rarely wasted away until late in December.

In reasoning from the researches of philosophy, we are taught to place but little reliance on the uncertain narratives of tradition; they, however, with a slow yet steady advance, acquire respect, and (often) mould theory into fact, and fashion opinion into fixed principles. The common belief that our climate has been changed into a milder temperature, has taken most of its certainty from the statements of our old people, who are uniformly consistent in this particular. The bloom of the orchard trees formerly restrained by a protracted winter from premature expansion, rarely failed arriving at the maturity of fruit; the earth remained covered with snow for many weeks, and the winter did not, as now, dally with the wantonness of spring. The marshes, uncleared lands, ponds and lakes, which conspired to absorb the heat of the earth,* have been almost obliterated or greatly reduced. There is a lesser quantity of snow, and more of rain, while the frequency of violent storms of wind in the spring and summer, distinctly prove the great mass of our local heat, and accumulated electricity.

The winds of Virginia are singularly fickle and capricious, possessing neither the uniformity or regularity of those which blow at the tropics. Our prevailing wind is the south west, which assumes, alternately, gentle and severe characteristics. The frequency of south western winds above the latitudes of the trades, flows as a necessary consequence, from the continuance and direction of the vast current of air. It moves unconfined and unresisted over the sea, until it reaches that unbroken range of mountains, which towers from one extremity of our continent to the other. It strikes against them, and from its elasticity rebounds with great velocity, in a direction opposed to the forcing powers of the trades, taking in its oblique movement all those features which mark our south western wind.

During the spring the north east is the most common wind. The huge masses of snow and ice at the north pole, are gradually melted by the heat of the sun; great quantities of vapor during this time are exhaled and remain suspended, augmenting both the weight and bulk of the atmosphere. That wonderful and mysterious agent, *electricity*, in dispelling the vapor and converting it into elastic air,† gives an impetus to that wind

* This principle is apparent from the fact that marshy countries are always cold; the decrease of temperature after a violent rain, also proves its truth. An unusual evaporation carries off the heat of the earth, and may we not reasonably expect a cold winter after a wet summer?

† Through a glass tube filled with water, Dr. Franklin passed an electric shock, the tube was shattered to pieces, and the water disappeared; a similar experi-

ment was tried with a tube filled with ink on a sheet of white paper, the same effects were produced, the paper being neither stained nor discolored.

which issuing from the poles, takes a north eastern direction as it advances southerly, (its diurnal motion being less than that of the earth,) and falls surcharged with snow and rain on every portion of our country.

Mr. Jefferson made 3698 observations on the various points from which our winds blew, noting their changes two or three times in each day. The prevalence of the south west winds, over those from other quarters is thus numerically stated by him:

South west,	926.	North,	409.
North,	611.	West,	351.
North east,	548.	South east,	223.
East,	521.	South,	109.

He has also made a comparative view of the difference between the winds at Monticello and Williamsburg. He has reduced nine months' observations at Monticello, to four principal points, being perpendicular to, or parallel with, our coasts, mountains, and rivers, viz: the north east, south east, south west, and north west. He has also reduced an equal number of observations, 421, from his table above, taking them *proportionally* from every point.

My own observations made many times in each day, amount to 749, without reducing them in the proportionate manner of Mr. Jefferson. I have submitted them under the points and heads which he has adopted:

	N.	E.	S.	E.	S.	W.	N.	W.	Total.
Williamsburg,	127	61	132	101	421				
Monticello,	82	91	126	172	421				
Braynefield,	204	130	247	168	749				

In an average of two years, I have found our winds thus yearly prevailing; the dominant wind of each day being only reckoned, and not the usual vicissitudes of local breezes, or squalls.

	Days.		Days.
South west,	122	East,	30
North west,	89	North,	26
North east,	61	South,	21
		West,	12
	272	South east,	4
			93
			272
			365 days.

A curious phenomenon is sometimes witnessed during a severe wind from the south west; a thin vapor or scud is seen moving with great velocity below the clouds, from the north east, there being two currents of air of directly contrary courses in active motion at the same time.

In the early part of the spring and autumn, in dry seasons, about sunset, it is common to meet with currents of warm air, small in their extent yet extremely rapid in their movements; they are considerably above the heat of the human body, and are wayward and eccentric, both in their du-

ment was tried with a tube filled with ink on a sheet of white paper, the same effects were produced, the paper being neither stained nor discolored.

ration and extent. Their existence has given rise to much speculation, and even the experienced philosophy of Mr. Jefferson has succumbed to the mystery* of their origin.

Our *frosts* are sometimes equally severe and unexpected; no body placed near the earth has a temperature of its own, but is entirely regulated by that of the earth. A violent storm of rain, by absorbing much of the heat of the earth, is often followed by a destructive frost. When the power of frost reaches a certain pitch, the vapors dispersed throughout the air, yield their latent heat—the atmosphere becomes clouded, the frost is either destroyed or mitigated, and the vapors descend in rain or snow.

Our hardest frosts never penetrate the earth more than three inches, and though the leaves of the trees and shrubs are scathed or destroyed, and timber sometimes splits in the direction of the fibres of the tree, its roots uniformly remain uninjured. Those portions of vegetation which grow nearest to the earth, and those in low and marshy situations, receive the severest injuries. On the night of the 17th May, 1834, the leaves of the oak, hickory, and all the forest trees, were blighted in most of their foliage; the sycamore only remained unharmed. Frost during the winter, is a fatal enemy to those plants which are nurtured in southern exposures; they are rarely covered with snow, which melting rapidly, is converted in the course of the night into destructive ice. Our *white frost* is generally harmless, it being simple dew slightly congealed.

Dew is found in Virginia in heavy masses, generally in the months of August, September, and October; it lies in greater quantities on our flat than high lands, being collected there during the absence of the sun from the horizon, like the relics of a drizzling rain; it appears first on the lower parts of bodies, because in the evening the lower atmosphere is first cooled and most disposed to part with its vapor.

Virginia is subject to *rains* of vehement and long continuance; they fall in the largest quantity about the breaking of the winter, and in March and September; I have no *data* on which to reckon their depth† or their prevalence over the fair and cloudy days of our climate. Our valley and western regions, by the condensing power of their mountains, and our tide water sections, by the attractive force of broad rivers, have more local rains than the intermediate country, and do not suffer in the same proportion from continued droughts. If a year be remarkable for rain it is fair to conclude that the ensuing winter will be severe, from the great evaporation of the heat of the earth, and if the rains have been violent, sterility and barrenness will follow in the next year

* May they not proceed from that latent *electricity* which pervades the air most in dry seasons, and which is attracted to the human body by its heat,—thus producing from the action of *affinity*, the feeling of sudden warmth?

† According to the observations of Dr. Sanders made near Boston during ten years, from January 1, 1821 to January 1, 1831, there were on an average in each year, 219 days of fair and 146 of cloudy weather. Rain fell more or less on 57 days. Boston is on the sea coast, in latitude 42 deg. 20—58 min. and the standard temperature of the level of the sea at that place is between 59 deg. and 60 deg. Fahrenheit.

in proportion, as the surface mould so vital to vegetation has been scattered and wasted away.

Our Indian summer presents an ample field for the creations of fancy and the conceits of theory. It generally follows excessive and protracted droughts, and is dispersed by heavy rains. It has been traced to electric influence—to the burning of mountains—to the existence of numerous impalpable atoms of decayed vegetation, and has been assimilated to those light gray clouds which overhang Peru. May we not ascribe it to that mass of accumulated vapor which is precipitated on the lower atmosphere, while the continued action of the heat of the earth, and the rays of the sun conspire to produce the dense medium through which the light is so irregularly refracted?

But I must conclude my tedious communication or I shall incontinently vex you with the idle speculations of delusive theory, which in seducing from the path of truth, ever persuades us that its fond dreams are facts, and its forced assumptions, fixed principles.

W. G. M.

ON THE ORIGIN OF THE TURNIP FLY, AND MEANS TO PREVENT ITS RAVAGES.

From the Entomological Magazine.

The turnip fly is not always of one kind, but the difference in them is not very important; for they only alter in their paint, their build is always alike. The most common is bottle-green, but in some fields all are painted black, with a white line on each side from stem to stern down the neck. They are so active, that the only way in which I could ever obtain them in newly sown fields, was by sweeping the surface with a gauze net, on an iron hoop at the end of a strongish stick. They jump like fleas as soon as they see you. This insect, or rather its grub, commences its attack on the turnip as soon as it is up, devouring the two cotyledons and the little heart, and sometimes in a few days leaving the field as brown as it was on the day it was sown. Schemes without number have been tried to get rid of or kill this little pest wherever it has appeared. I have always observed the greatest quantity of grubs on very young plants; they are very various in size, and it is not before the plants are a fortnight or three weeks old, that the beetles appear in any quantities. Yet there are some beetles observed at the first coming up of the plants. Now I know from experience, that the turnip-fly feeds on wild mustard, and several other hedge plants, and therefore it is not improbable, that when they smell the fragrance of the fresh bursting cotyledons of their favorite food, they would skip down from their spring habitations, the hedges, and make the attack. I first sowed some seed in a flower-pot, with earth out of my garden; it produced the animal in abundance. Secondly, I enclosed the pot with pasteboard and canvass, with the same success; but still there was a possibility of the enemy getting in, as I had not the cover sufficiently close. Thirdly, I made a light frame about eight inches square, covered it with very fine silk gauze, carefully stopping the crevices of the door with pasted paper, and round the pot where the cover was fastened on with putty, so that there was no possibility of any thing coming to it from without. Yet this experiment was attended with the same success;

except that one point, a negative point, was now proved, namely, that the fly did not come to the turnip from other plants, and this was a point gained. Fourthly, I baked the earth in a cast-iron pot over the fire, and used no other water to water the seed but such as I had boiled myself, applying it at the bottom of the pot with a common feeder. Then I exercised the same care, and took the same precaution as before. I did not take off the cover till the plants were of a considerable size, and I found them all a-hop with beetles. I had now made another step; having before found that the beetles did not come from other plants, it was now clear that it was not in the earth or the water. Fifthly, with a lens I examined the seed, and found on it a number of white flattish substances; some of the seeds were without any, but there were generally one, two, three, four, and in one instance five on a single seed. These I concluded were eggs, and I thought the only way left me was to attack them. It would have been easy enough to poke them off with a needle, but I could not see how I was to employ a needle and a magnifying glass on a sack of turnip seed. I therefore made some pretty strong brine, and soaked the seed in it for twenty-four hours, then dried it thoroughly, and with all the precautions which I have mentioned, I sowed it again, and there was not a single fly, neither was there a single turnip injured. I tried again and again, and I found that, without weakening the brine, if the seeds were only kept in it three hours, there were no beetles, but yet the seed came up as well as ever. I now practise this method with turnip-seed, cabbage-seed, and in fact with all the cruciform plants in common cultivation, with very satisfactory success. The whole of these experiments were made on the Swedish turnip, which is generally more infested by these beetles than any of the other sorts.

Note by the Editor of the Quarterly Journal of Agriculture.

We sometime ago mentioned, in regard to avoiding the attacks of the turnip-fly, that a farmer completely succeeded in avoiding them for many years, by rubbing, keeping, and sowing his turnip-seed among flour of sulphur. Since the turnip insect is attached to the turnip-seed, it is clear that the sulphur must have destroyed them. This attachment of the nidus of the insect to the seed is a very remarkable circumstance, and requires farther investigation than the experiments above related, to establish the fact as a general one.

THE TURNIP FLY.

Mr. Berry ascribes his success in this department of rural management, and which, he says he has observed as closely as possible, first, to sowing seed of one year's growth, which secure simultaneous vegetation, and defies the fly; the plants being numerous. Seedsmen too frequently mix the seed of different years, in consequence of which it comes out of the ground at various periods, and in such quantities, that the fly easily overpowers the crop. Second, thick sowing. It is much easier to cut out than to insert a plant. Third, sown immediately after the manure is ploughed in, by which the advantage of the moisture is secured. In showery weather, he finds an advantage in steeping the seeds in water; but if the weather be dry, steeping

is injurious, the contrast being too great between the water and a dry, hot state of the earth, and the plants come up yellow and sickly.—*Repertory of Inventions.*

WHALE CHASE.

A Scottish journal, the *Caledonian Mercury*, describes the following animated scene, which took place in May last, off the town of Stornoway, in the island of Lewis. An immense shoal of whales was, early in the morning, chased to the mouth of the harbor by two fishing-boats, which had met them in the offing.

The circumstance was immediately descried from the shore, and a host of boats, amounting to thirty or forty, and armed with every species of weapon, set off to join the others in pursuit. The chase soon became one of bustle and anxiety on the part both of man and fish. The boats arranged themselves in the form of a crescent, in the fold of which the whales were collected, and where they had to encounter incessant showers of stones, splashing of oars, with frequent gashes from a harpoon or spear, while the din created by the shouts of the boats' crews and the multitude on shore, was tremendous. On more than one occasion, however, the floating phalanx was broken, and it required the greatest activity and tact ere the breach could be repaired and possession of the fugitives regained. The shore was neared by degrees, the boats advancing and retreating by turns, till at length they succeeded in driving the captive monsters on a beach opposite to the town, and within a few yards of it. The gambols of the whales were now highly diverting, and, except when a fish became unmanageable and enraged while the harpoon was fixed, or the noose of a rope pulled tight round its tail, they were not at all dangerous to be approached. In the course of a few hours the capture was complete, the shore was strewn with their dead carcasses, while the sea presented a bloody and troubled aspect, giving evident proofs that it was with no small effort they were subdued. For fear of contagion, the whole fish, amounting to ninety-eight, some of them very large, were immediately towed to a spot distant from the town, where they were on Thursday sold by public roup, the proceeds to be divided among the captors. An annual visit is generally paid by the whales to the Lewis coast, and besides being profitable when caught, they generally furnish a source of considerable amusement. On the present occasion, the whole inhabitants of the place, male and female, repaired to the beach, opposite to the scene of slaughter, where they evidently were delighted spectators, and occasionally gave assistance. A young sailor received a stroke from the tail of one of the largest fish, which nearly killed him.—*The Mirror.*

COOKING FOOD FOR HORSES.

When the food is broken down by cutting the hay and straw, and bruising, boiling or steaming the oats, not only is there less waste, by the whole being used as manger meat, but much labor is saved to the animal, in having the tough dried hay, and hard oats, masticated for him, and in a state almost prepared for digestion; and, as regards the oats, all the nourishment they can afford is readily yielded to the digestive organs; for unless the grain

is broken down, or otherwise killed by boiling, it is not acted on, and will grow as readily after having passed through the horse, as the olives have done after passing through turkeys. Oats, like every other seed, is possessed of vitality, and it would appear that the organs of digestion, and their secretions, do not act upon bodies possessing it. Were it not for this exception, the gastric juice, which acts upon and dissolves every dead matter taken into the stomach, would act upon the stomach itself; but it is not possessed of this power. It is therefore necessary to destroy the life of the food taken into the stomach before it can yield nourishment to the animal. This may be done by bruising, and the finer it is bruised the better, because it is capable of being more completely mixed with the cut straw or hay, and the whole is then more easily eaten, but as experiments of Captain Cheyne have shown, it may also be steamed or boiled, and given with the same advantage; and from what has been stated regarding digestion, it must be pretty obvious that this kind of cooking brings the food nearest to the state of being readily dissolved and acted on by the digestive organs. The only objection which will at once occur, I know is, that boiled or steamed meat will incline a horse to purge: this, however, is not so much the case as many, without trial, may suppose, and where it does occur, it is perhaps owing to too large a quantity being given at one time, as indeed is almost invariably the case, for stable-men, when they give boiled food, always suppose it necessary, at least the practice is, to give nearly double the quantity or more at a time than they would think it proper to give of raw food; but if the rich cooked stewed food is mixed with a less nutritious and raw material, the whole of the boiled is taken into the system, without producing the laxative effect. All horses on this restricted feeding are found to be light in their belly; but while this is the case, the appearance of their coats, the quantity of fat on their ribs, and the manner they are able to do their work, show that they have sufficient nourishment, while (what is the subject of the most important consideration) their dispensing with the doctor, shows that their health is most materially improved by it.—Mr. Dick, in the *Quarterly Jour. of Agr.*

CULTIVATION OF THE SUGAR MAPLE AND CURIOUS MANNER OF PROCURING THE SEED.

From Goodsell's *Genesee Farmer*.

Mr. Goodsell.—Every one is delighted to see our native forests thickly planted by the hand of nature with this valuable and beautiful tree; valuable, because for cabinet work some varieties of this wood are superior to that brought from distant climes; first rate for fire wood, and as good for the manufacture of sugar as the cane plant. And who does not regret the destruction of the axe-man amongst them. Occupying the best soil, they are usually the first victims. But he who destroys should endeavor to produce anew. No native tree can be more easily cultivated than this, the seed being abundant and easily procured. It grows rapidly from the seed in open cultivated grounds, attaining the height of six feet in three years, and in twelve years the stems will measure from six to nine inches diameter. I send you a quantity of seed as a specimen; they are ready prepared for sowing, and are divested of the shell and wings;

in their natural state, being connected together in pairs, they are usually called maple keys. About a peck is sufficient for seeding three acres of ground. Nature would seem to dictate the fall of the year to be the proper time for sowing the seed in their natural form, as the effect of the frost would be to soften the shell. At this season they are scattered abroad by the wind in infinite profusion. But divested of the shell and sown in the spring they will grow as surely as peas, and make their appearance at the time the forest trees put forth. They should be sown, or rather scattered upon the furrows of dry land, and harrowed in, and grass seed should be sown for future pasture. Hogs, calves, sheep, horses, &c., may be pastured among them, but no cattle, till they are out of danger. The third year, either fall or spring, they should be taken up, where too thick, and transplanted in vacancies. One thousand may commence growing upon an acre. In twelve years, an enterprising farmer, who wishes for the future prosperity of our country, as well as to enhance the present value of his lands, would walk five miles bare-footed before sunrise in the month of June, to view the "sugar bush" of our climate, in full foliage, situated near the residence of the owner, sheltering his fruit trees and habitation from storms, and the resort of the songsters of the air. The leaves of the grove might be collected for the barn-yard. At the age of twenty-five years, the trees might be tapped. I was bred upon a farm, in a deep valley of the mountains, on the eastern border of this state, and have witnessed the growth of the sugar maple in groves from the seed, and also standing singly in fields, where they have stood for more than half a century, presenting a more beautiful appearance than the trees of any land or clime. My occupation now is farming. As to the manner of procuring seed: I send you about one-fourth part of the winter store of a buck or wood-land mouse, which was deposited in a living hollow beach tree, 15 inches diameter; the whole of his store, being about one bushel, one half beach nuts, with a few other seeds, and shelled, and neatly put up for winter provision, and a nest within, lined with down, the residence of the family. A boy found another store-house the same day, which was 25th of December last, containing half a bushel of maple seeds, with others. Boys are skilful in such kind of hunting. In this way seed stores might be furnished with them from the maple forests of the west, in quantities sufficient to plant out territories and kingdoms. The buck mouse enters his habitation through a smooth hole an inch or less in diameter, into the hollow of the tree, sometimes nearer and sometimes further from the ground. At the commencement of cold weather and snow, the red squirrel visits the place daily, and endeavors with much chattering to gnaw through, to rob the mouse of his store. By this recent gnawing around the hole, and by tracking in the snow, the habitation of the mouse may be discovered. This little animal, also deposits vast quantities of elm seeds, in hollows of the branches and trunks of that stately tree. In the night seasons, when all his enemies sleep, except the owl, he is busily employed during fall months, in running up and down the tree, and laying up his winter store. The habitation of the mouse is frequently occupied afterwards by the honey bee. Whenever

the maple bears seeds, the mouse, in maple forests, is sure to have a proportion of them for his food.

S. H.

Clarendon, Jan. 25th, 1834.

FLIES.

It is well known that flies will deposite their eggs on any surface which affords a suitable nidus for them. I remember a gentleman's son who suffered severely from the larvæ (maggots) of a fly, which proceeded from eggs that had been laid in the ear; but the most extraordinary case of this sort which has come to my knowledge occurred in a negro man at Kellitt's estate, in Jamaica. He was a tradesman, and a very intelligent fellow. When I first saw him, his nose and cheeks were very much swollen, rendering his face hideous; and he suffered much severe pain. I immediately suspected the cause, and soon succeeded in making the residence of the maggots so uncomfortable to them, by application of turpentine and olive oil, with green tobacco juice, up the nostrils, that they came away gradually; but it occupied at least a fortnight before the whole were removed, so deeply lodged were they in the usual passages. I desired the man to keep a tally of the numbers of his tormentors; and he did so, I have no doubt, faithfully, after which he handed it to me, and it is still in my possession. It contains 23 crosses (X) for ten each, and V for five, amounting to 235 larvæ of, I believe, the bluebottle fly. Almost all of them were full grown, and forming, perhaps, such a brood of maggots as never proceeded from any man's head before. Flies abound upon sugar estates; and, when we recollect how often negroes go to sleep in the open air, the wonder is that similar incidents do not occur more frequently.—*Magazine of Natural History.*

NEW METHOD OF HARVESTING GRAIN.

We have examined the drawing of a machine to gather grain as it stands in the field without cutting. It is called the Locomotive Thresher; intended to be moved by horse power, and, with the assistance of three men or boys of fifteen years of age, is calculated to go over ten acres of wheat or other grain per day, and gather say two hundred bushels, leaving the straw standing on the ground thrashed as clean as is generally done in the ordinary way, thereby saving all the expense of harvesting; and by ploughing in or burning the straw, it is supposed the ground may be tilled *ad infinitum* without diminishing its fertility. Should this invention succeed, it will afford another inducement for farmers to inhabit and cultivate those beautiful prairies which abound in the far west. The ingenious inventor is Mr. John T. Vail, of La Porte, Indiana, formerly of this town.—*Rahway Advertiser.*

THE AERIAL PLANT.

The burning sands of hot climates, even at Karsfields of the Cape of Good Hope, which are so arid and scorched that no water can be extracted from them, are the media in which the most succulent vegetables of which we have any knowledge, flourish and evolve; so deleterious indeed, is a wet season to their growth, that they are destroyed by it.

There are also various tribes of vegetables that are destitute of roots, and which can only be supported and nourished by the air, and by the moisture which the atmosphere contains. A large portion of the class Fuci, have no root whatever; and it is stated that the *Aerial Epedendron*, (the *Epinendron Flos Aëris*, denominated aerial from its extraordinary properties, and which is a native of Java, on account of the elegance of its leaves, the beauty of its power and the exquisite odor which it diffuses, is plucked up by the inhabitants and suspended by a silken cord from the ceiling of their apartments, from whence it continues from year to year to put forth new leaves, to display new blossoms, and exhale new fragrance, although fed out of the bodies before stated.—*London Mag.*

MILKING COWS.

The operation of milking is performed differently in various parts of the country. In some, the dairy-maid dips her hand into a little milk, and, by successively stripping the teat between her fingers and thumb, unloads the udder. This plan, however, is attended with the disadvantage of irritating more or less the teat, and rendering it liable to cracks and chops, which are followed by inflammation, extending to the rest of the quarter. This accounts for the disease occurring more frequently among the cows under the charge of one milker than it does in those under the charge of another, and as this practice is more common in some parts of the country than in others, it also accounts for the disease being more common in these parts. This plan of milking where the irritation is not sufficient to excite the extent of inflammation as above, frequently produces a horny thickening of the teat, a consequence of the cracks and chops, which renders it more difficult to milk than when in its natural state, and at the same time predisposes to inflammation, when any cause occurs to set it up. These effects may be, and is almost entirely, avoided by the more scientific plan of milking adopted in other parts of the country, where, instead of drawing down or stripping the teat between the thumb and fingers as has been stated, the dairy-maid follows more closely the principles which instinct has taught the calf. She first takes a slight hold of the teat with her hand, by which she merely encircles it; then lifts her hand up, so as to press the body of the udder upwards, by which the milk escapes into the teat, or if (as is generally the case when some hours have elapsed between milking times) the teat is full, she grasps the teat close to its origin with her thumb and fore finger, so as to prevent the milk which is in the teat from escaping upwards; then making the rest of the fingers to close from above downwards in succession, forces out what milk may be contained in the teat through the opening of it. The hand is again pressed up and closed as before, and thus, by repeating this action, the udder is completely emptied, without that coarse tugging and tearing of the teat, which is so apt to produce disease.—*Quarterly Journal of Agr.*

CHIMNEY SOOT AS A MANURE.

This article is said to be an excellent manure, if properly applied. It is generally mixed up with earth and dung as a compost; in this state it is

worth little or nothing; but when properly applied, by being kept dry, and sown on young wheat, clover, or vetches, in March or April, its effects are most extraordinary; in a few days the yellow sickly plants will assume a dark green, which is as much a test of health in plants as the rosy cheeks of a dairy-maid. The fact is, plants receive nearly as much nourishment from the air as the roots; and as the soot is throwing off abundance of gases, which are imbibed through the pores of the leaves, it gives a healthful vigor to the plant, and enables it to throw forth its roots to supply nourishment during the stages of blossoming and perfecting the seed.—*Repertory of Inventions.*

TOBACCO CULTURE—NO. 3.

[Continued from p. 752, Vol. I.]

To the Editor of the Farmers' Register.

Cutting and Curing.

The process of cutting tobacco, is so simple and so generally understood, that it scarcely needs an explanation; the whole art consisting in placing the knife on the top of the stalk in such a direction as to split the stalk nearly to the bottom leaf, without cutting off the leaves. The stalk is then to be cut off immediately below the last leaf, and the plant is then set up on the ground, with the but of the stalk up, so as to expose the stems of the leaves to the sun, that the plant may become limber enough to handle without breaking. The splitting of the stalk, answers the double purpose of hanging the plant on a stick, and rendering it more easy to be cured by fire. Tobacco should not be cut early in the morning, when the dew is on it; as it will thus become very dirty if set on the dry ground. But these suggestions are but of little importance when compared with the difficulty of determining with precision, when the plant is at its greatest perfection. Or in other words, *how* to cut, every planter knows, but *when* to cut, has been a matter of dispute, even amongst the best informed, and most skilful planters. Some contend, that tobacco should get very ripe before it is ready for the knife. That is, it should become in the general, full of yellow spots all over, and that the leaves when doubled, and pressed between the fingers, should split, or break freely—while others contend, I think with more plausibility, that it ought to be cut before the grain of the leaves will crack freely, when pressed as above described. It is manifest to me, not only from the reasonableness of the thing, but from experience, that tobacco is at its greatest perfection in quality and weight, before it becomes very full of yellow spots, and also, previous to the grain breaking freely when pressed: for it seems clear to me, that its getting very spotted, and very brittle to the touch, are both evident marks of the plant being on the decline, and of course, must have lost, some of its essential oil, together with its silkiness, and tenacity of texture. The heaviest and highest priced tobacco, I ever made, was cut at the stage above described. I am therefore convinced, both from experience and observation, that many good planters loose both in quantity and quality, by letting their tobacco stand too long in the field. The tobacco then being thus cut, and sufficiently limber to handle without breaking, the sticks should be brought into the field, the plants picked up, and eight or ten plants put on each stick, having first

stuck the end of each stick obliquely into the hill under the roots of the stalk, so as to keep the tobacco from the ground. I think this the best mode, as the tobacco may safely remain in the field all day, without injury, when making a large cutting, (which is often necessary) and also, can be more safely, conveniently, and speedily removed to the scaffold, or barn, as circumstances may require. If the weather should be fair and mild, after cutting it is best to scaffold it three or four days, that the sun may commence the curing process, by yellowing the plants, killing the stalks, and reducing the sap—all of which contribute much to the successful application of fire. If the tobacco is hung on scaffolds, the sticks should be pressed close together, to prevent the sun from burning it, and also to hasten the process of yellowing the plants. But on the other hand, should the weather be rainy or windy about the time of cutting, it should be removed immediately from the field to the barn, and hoisted up, leaving a space of from eight to twelve inches, between the sticks throughout the house according to the size of the plants. I see my neighbor J. F. Edmunds, who is one of our most skilful planters, has recommended the plan of putting the sticks about half the distance in the top of the house, that is customary, and gradually widening to the bottom—say five inches at top; and eleven at bottom. I think this a valuable suggestion, as I know the tobacco in the top of the house always cures first. This plan will retard the curing of the top, and consequently bring the top of the house on an equality with the body, and must therefore give a more uniform house of tobacco. The heat being always concentrated in the roof of the barn, I have invariably observed that the tobacco when cured, is much darker in the roof than the body of the house. If this reasoning then, is correct, there is a two-fold advantage in this plan—that is, a saving of room, as well as a more uniform house of tobacco. But to return from this digression. The planter having his barn well filled with tobacco and a large quantity of wood prepared, both green and seasoned, he commences his fires, with mingled feelings of hope and fear. For I may truly say that this is not only the most difficult part of the whole management of the tobacco crop, but the most slavish and hazardous. This is the rock on which the hopes of the planter have been often suddenly dashed; for no matter how fine the tobacco, or how skilful the planter, if outward circumstances should be unfavorable, high winds, &c. it will be impossible to cure a good house of tobacco. The curing process has always been a most difficult and dangerous one, but has been rendered doubly so for the last ten years, by the demand for bright French tobacco. Were a stranger suddenly to open one of our *cellared* barns, (where the fires had been unremittently kept up, from Monday morning until Saturday) and see one of the hardy sons of Africa, with his red eyes and sooty locks, he would imagine himself on the borders of the infernal regions. But thanks be to the whimsicality of the French, or the avarice of the Scotch, or whatever other cause that has put this kind of tobacco out of fashion, for it will save the planters many a load of wood, and many a sleepless night, and me much time in describing the tedious process of curing it. As the old fashioned dark tobacco is now in demand, instead of

taking a week to cure a house, it can now be done in three days, with half the care and trouble. As I am writing on the eve of a change of fashion in tobacco, I shall not attempt to describe the process of curing with that minuteness that accords with my original design, but shall content myself with remarking, that as there has been a radical change in the sort of tobacco in demand, within the last twelve months, it is not yet ascertained what particular process of curing will suit the capricious taste of the foreign consumers, or the still more fastidious taste of our domestic purchasers. I think I can however, very safely congratulate the planters of our country on a change, contributing so much to lessen the labor and expense of curing their crops. This brings me to the consideration of the fourth branch of the subject, that is, the stripping and pressing of the crop, which will form the subject of my next communication.

G.

Wardsfork, Charlotte Co.

MANURES.

To the Editor of the Farmers' Register.

Will you permit a constant reader of your valuable journal to propose a subject for an article? It is this: "The best method of collecting, preserving, and applying manures." If the subject is too extensive, I should with others, feel much indebted to some good practical farmer, who will give your readers an essay on the "Application of manures"—including the time when the land should be manured—the state of the manure—method of applying—whether it should lie on the land any length of time, or be immediately turned in with the plough, &c., &c. This last part of the subject I think deserves particular notice.

A large portion of your readers reside in a country where "calcareous manures" cannot be procured, but at some considerable expense; and the valuable works already published would obviate the necessity of touching on that branch of the subject proposed.

O. P. Q.

ON THE PRESERVATION OF PLANT BEDS FOR TOBACCO.

For the Farmers' Register.

Owing to the extravagant custom of selecting and burning new beds for plants every year, the land best adapted to plant-raising has become in many parts of the country very scarce. Hence the great difficulty of planting at a seasonable time the tobacco crop, upon which so much is dependant as to the product. The difference between a late and forward crop, the past experience of all tobacco growers can abundantly testify. It is not my object to say any thing respecting the many disadvantages, and great loss to the planting interest arising from late crops. But I propose inviting attention to the importance of preserving such land as is best adapted to raising plants, and to state some experiments which I have tried with considerable success. The general impression is, that plants cannot be raised with as much certainty on old as new beds. The former generally are in open fields, and more exposed to the winds and sun, which cause them to dry much sooner than the latter, which are almost invariably in the woods,

where they are better protected. I believe that but little, if any difference has been observed in beds similarly located and properly managed.

Many expedients have been tried, and some have failed, whilst others have succeeded, in raising plants on old beds. For the last six or eight years, I have raised fully half of my plants from old beds, some of which have been burnt regularly during the whole time, and are more productive now than when first burnt.

I will mention two or three expedients which I have tried with considerable success. Covering the bed with leaves or brush, serves to protect it from the sun and prevents grass from putting up and seeding, which is very desirable. The only objection to this mode is that the bed will need manure every year, and the difficulty of getting such as is suitable, and free from grass seed, is, and has been, the great objection to this plan. As a remedy I will suggest an experiment I made and with which I was much pleased, in consequence of its success, which was this: as soon as I had drawn all the plants I intended from the bed, I penned my cattle on it until it was well manured—(care should be taken not to suffer them to go on when the land is wet.) It is important that this should be done as early as possible, that it may be sufficiently manured before the grass seed is ripe, which will be a great economy of labor and wood, as the bed will require but little burning—(the land having been once well burnt.) So far as my experience serves, this supersedes the necessity of manuring after the plants have come up, which is a very troublesome job, and but little of our lands now left for this purpose will bring plants without it. So soon as the cattle are removed, the bed should be covered with brush until the fall or early in the winter, when it may be removed, in order that the bed may dry for burning, which if done during some dry spell at that season, will require very light burning: frequently brush will be sufficient, provided no grass has been suffered to grow and seed on the bed. It would be well to pay some regard to locality in making a selection for a standing bed. Under our present plan we will soon be deprived of all those spots so favorably situated for watering, and so have increased the difficulty of raising plants. Would it not be well to preserve such spots as can be conveniently watered? I have no doubt, from a little attention to this subject, that we may with less labor and with equal, if not greater certainty, raise an abundance of plants, by burning (instead of the whole) say one half new, and the balance of old beds.

H.

NEW SPECIES OF WHEAT.

A variety of wheat which does not seem liable to the attacks of the wheat-fly has been accidentally found. It is most prolific, grows a foot taller than the common wheat, but is not like the Revel wheat. It is awned, and somewhat like the Egyptian, but of a clearer color, without the protuberances of the latter. If once a supply of this variety for seed is found, the fly will be starved. Of a patch standing in the middle of a field, where every ear of the common wheat was hurt, and where flies were very numerous, not an ear was touched, although other bearded varieties suffered.—*Mr. Gorrie: Highland Society Transactions.*

**REPORT ON FARMS, OF THE COMMITTEE OF
THE AGRICULTURAL SOCIETY OF ALBEMARLE.**

Made to the Society at their Show and Fair, 21st October, 1828.

We the undersigned committee acting under an order made by the Agricultural Society of Albemarle at their meeting in May last, and appointed to view the farms offered for premium, commenced our duty by viewing the farm of John H. Craven (one of the competitors) on the 20th of October. We found that part of his farm, called Pen Park, on the western side of the river in a rapid state of improvement; and, from the information of Mr. Craven, together with the knowledge of some of the committee as to the exhausted state of this part of his farm when he came into possession of it, are of opinion that it has been judiciously managed. But that part of his farm called Franklin, lying on the eastern side of the river has not improved so rapidly, which may have been caused by closer grazing or more frequent cultivation.

On this farm the negro cabins and other out houses are very good, and his farm pen shows, that there is great attention paid to his stock, which are of superior quality for this section of country. His horses, colts, hogs, &c. appear to have been well attended to.

We gave Mr. Craven and all the other competitors a copy of 22 questions marked A, with a request that they would answer them as explicitly and with as much accuracy as circumstances would admit, in their several reports. They have been answered by Mr. Craven in his report marked B.

On the next day we proceeded to view the farm (Ridgeway) formerly the property of Peter Minor, dec'd. This farm, when Mr. M. came into possession of it was, we believe, the greater part, in woods; consequently, we suppose, fertile when cleared, and comprehended likewise a large quantity of alluvial land, of fertility almost inexhaustible. We know of no farm for which nature has done so much. These circumstances together with tolerably good management, have made it, perhaps, the most valuable farm within our knowledge.

There has been more stone fencing done on this farm than any of those exhibited for premium, and the out houses (viz) negro cabins, tobacco houses, mill, barn, &c., have, we think, been judiciously arranged, and, are of superior quality. Most of them are built of stone. The work horses on this farm are of superior quality and well attended to. We gave Mrs. Minor also a copy of our questions marked A, to be answered in her report which we have received marked C.*

We viewed Wm. H. Meriwether's farm next. This farm is in a state of improvement, and a very valuable plantation. But, from the circumstance of his cultivating large crops of tobacco, and appropriating the greater part of his manure to the cultivation of this crop, his farm has not improved so rapidly as it would otherwise have done. This crop has also prevented paying that attention to neatness, &c. which usually goes hand and hand

with good farming. Our questions have also been answered by Wm. H. Meriwether marked D.

We next, and lastly, viewed the farm of John Rogers. This farm, we think, has been most judiciously managed as it regards profit, neatness, improvement of the soil, arrangement of the fields; and in fact all his management denotes him as being a farmer of more than ordinary merit. We have therefore awarded to John Rogers the premium of \$50 for the best cultivated farm.

We furnished Mr. Rogers also with a copy of our questions marked A, which he has answered in his report marked E. This report has entered less into detail and is less explicit than we could have wished, but he has made an apology to the Society, and a promise to us, that he will at our next spring meeting give to the society an account in detail of his whole progress from the commencement of his operations to the present day.*

In awarding the second premium the committee confess themselves to be somewhat at a loss. Here two farms come into comparison; one worn out and exhausted at the time the owner came into possession of it; the other but very recently cleared and but a very small portion of it that was ever worn out and possessing immense resources for fertilizing itself.

But Mr. Craven has, notwithstanding his limited resources of both money and manure (too very important articles in making an exhausted farm rich,) not only improved his farm as it respects fertility of soil, but has added much to its appearance by the stoppage of innumerable gullies; and a considerable quantity of stone fencing put up in a very handsome manner.

Taking all the circumstances into consideration relative to these two farms, we have given Mr. Craven the preference, and, accordingly, award to John H. Craven the premium of \$25 for the second best farm.

The above reports together with the several reports of the competitors, are respectfully submitted to the society, and the committee beg they will take those reports as part of their own.

N. H. LEWIS,
JAS. CLARKE.
JOS. HARPER.

Question 1st. What is the number of acres in your tract of land, and what proportion of it is in cultivation?

2d. How many changes or fields have you, and what are their size?

3d. What is your rotation of crops?

4th. At what season of the year do you plant or sow the principal seeds; (viz) corn, wheat, rye, oats, and clover, and in what manner do you prepare the earth for them?

5th. What is your mode of cultivating the crop of corn?

6th. What quantity of wheat do you sow to the acre, and do you vary the quantity according to the quality of soil and season when seeded?

7th. What kind of wheat do you think most productive, and are you particular in selecting the best for seed?

*The report marked C, was by permission of the Society, withdrawn.

*This report was withdrawn by Mr. Rogers; and in its stead, the fuller and more satisfactory one which now accompanies this publication handed in.

8th. In what manner do you gather your small grain? with the cradle or sickle? and why do you prefer one over the other?

9th. What was the average product of your farm in wheat and corn to the acre when you commenced your operations on it, and what is it now?

10th. How many laborers do you work regularly on your farm, and of what description? and are you in the practice of employing day laborers?

11th. How many horses, mules, and oxen do you work? do you raise them, and what is their relative value on a farm?

12th. What do you feed your horses, mules, and oxen, with, and in what manner is it prepared for them?

13th. What kind of plough do you prefer, and what are your reasons for that preference?

14th. How many horned cattle do you keep on your farm and of what description? Do you keep more than enough to supply the farm?

15th. How many hogs and sheep do you keep, and what is your manner of feeding them?

16th. Do you pen your stock at night during summer? If so in what manner do you confine them?

17th. What quantity of manure is annually made on your farm? of what description? at what seasons carried out, and in what manner do you apply it?

18th. What is your opinion (founded on experience) of the efficacy of plaster, in what quantities, at what seasons of the year, and what kinds of crops it can be most profitably used on?

19th. What quantity of clover hay do you cure per annum? how much per acre? what your process in curing, and in what manner do you preserve it after it is cured?

20th. Do you gather your own clover seed from the farm? If you do, in what manner?

21st. Have you been aided in the improvement of your farm by means of any other resources than those received from the farm exhibited for the premium?

22d. What is your mode of managing your negroes?

B

In reply to the questions propounded by the Committee of Judges on farms, the undersigned answers as follows:

Question 1st. My tract of land contains 875 acres, of which I have about 500 acres under cultivation.

2d. Which is divided into ten fields of very unequal size as before explained to the committee in my report to them, of which ten fields I have separate and accurate plats.

3d. My rotation of crops is one fifth part or 100 acres in corn, two-fifths or 200 acres sowed down in small grain, say wheat, rye, and oats, of which the principal part is wheat.

4th. I prepare the soil for oats and corn as soon after finishing the seeding of my wheat crop, as I can, commencing about the 1st of November, and frequently finish the breaking up by the end of the year. I prefer sowing my crop of oats early in March, on the land flushed during the fall and winter, without any other preparation; and harrow them in with a heavy harrow, drawn either by three horses abreast, or three oxen, two under the

yoke, and one with collar and hames. I think this the best way to work oxen either in the cart or harrow, as the single ox turns with much more ease than when encumbered with the yoke. I have sometimes been obliged to vary my mode of preparing the land for corn; for instance, it does not answer to flush a blue-grass turf in the fall of the year, for it will grow back, and be worse to plough by the spring, than if it had not been broken during the fall and winter. I prefer breaking this kind of land the last of April, and harrowing it very well with a heavy harrow, the way it was ploughed, for fear of turning the sod back and planting the corn immediately, which I have always found best to be done with a shovel plough having a coulter on the point, with which I open the furrow; and then cover the corn with one of the same kind. As soon as the corn is large enough to bear the large harrow, I pass it over it backwards and forwards on the same row, following with small rakes, with four flat iron teeth, about three quarters of an inch wide, with a very small hoe or chisel in one end. With this I rake the turf and clofs off the corn, and with the small hoe replant, and chop up whatever may be likely to choke the corn in the young state. I am now speaking only of the management of blue-grass land. As soon as I can get over in this way, I follow with cultivators once or twice over, and finish with the shovel plough, with the coulter on the point, during or soon after harvest. My mode of cultivating corn on land not set with blue-grass is somewhat different. Instead of using the cultivators after the large harrows, I run the naked coulter next to the corn on each side, and use the cultivator for the middle of the rows until the last time, when I generally plough the land all over, as close as the furrows can be laid. My preparation for wheat is very simple. I commence fallowing very soon after harvest, for two reasons: the first is, to let the clover seed ripen by which the expense of purchasing seed is saved; the second is, to save the labor of re-fallowing, as I think one ploughing amply sufficient, if done at the proper time. I sow my rye from the 1st to the 20th September, at which time I commence sowing wheat, and consider from that time to the 20th of October, the prime season. I am sure it ought not to be sown sooner, and the crop is very uncertain if sown later. I sow all my clover seed the last of March or the first of April.

6th. I formerly sowed from one bushel to five pecks of wheat, to the acre of land, but now sow from five to six pecks to the acre, agreeably to the quality of the land, and the time of seeding, as also the condition in which the land is when seeded, sowing always thicker on rich land than on poor, as also on rough land than on smooth, where all the seed can vegetate, as also late in the season, to enable the wheat to make its way earlier in the spring, to escape the rust.

7th. I have for many years sowed the most of my crop of the Lawler wheat, and (although not the most productive when the other kinds come in well) I have yet considered it the safest crop, from its capacity of resisting the fly more than any other. I am now sowing largely of the New-York Flint wheat, which has done well. I always select the best I have for seed, taking care to let it remain longer in the field, so as to become riper than the general crop.

8th. I have generally saved my grain with the cradle, where not too heavy, but should prefer reaping all heavy wheat with the sickle, it being much the neatest way to save all grain of this description.

9th. For several years I made not more than eight bushels of wheat to the acre; my crop of 1827, made nineteen bushels to the acre, and of the present year, 1828, the average has been but about fourteen bushels per acre; although, the prospect until within a very few days before harvest, was better than it had ever been before, but the crop was shortened by the hot and damp weather, and rust consequent thereon. I am unable to say what the increase of the corn crop of 1827 may have been, for my crop was so much injured by the cut worm, that it did not yield half a crop, and in consequence of the drought of the present year, 1828, I do not make half a crop.

10th. For the last two years I have worked 18 hands on this farm, viz: eleven men, six women, and one boy, with the addition of three watermen, (from harvest until we have tides for running the boats, say, two months generally.) I never employ any day laborers except in harvest, some few small chaps to assist in gathering wheat, whose wages do not amount in any year to more than thirty dollars.

11th. I work twelve horses and ten steers. Of the former, two are used as carriage horses, when occasion requires. All the horses except one have been raised by myself, and so have the oxen. I have no mules, and have never had any, and can therefore say nothing of their comparative value with horses and oxen. The horse answers for some purposes, for which the ox does not so well; yet I am at a loss to decide which animal is the most valuable. The horse certainly costs much the most, either by purchasing or raising him; his keeping and feeding are also much more expensive. I think every farmer ought to raise all the horses and oxen he uses. I never feed my horses on corn underground; their principal food, is chopped rye and corn, and ship-stuff, mixed with cut oats or rye straw. During the winter seasons, when my horses are not at constant work, they are fed with but little else than clover hay, on which alone, they will keep in good condition, if the hay be of good quality and cut before it gets too old. My oxen are fed with very little grain, even when at work; if they are plentifully fed with good hay or fodder, it is generally sufficient; but, when necessary to give any thing else, I have commonly used the offal from the mill, say, wheat bran mixed up with the chaff from wheat, which is a very valuable article used in that way.

13th. I decidedly prefer the old bar-share plough, with the cast iron mould-board to any other ever used by me, both for the superior manner of its performance, and for its strength and durability; also, for the great ease, with which its work is performed, both for man and horse.

14th. I generally have from sixty to seventy head of horned cattle on this farm; say, from twenty to twenty-five milch cows, ten work-steers, the balance, young cattle to keep up the stock. My stock of milch cows is larger than necessary for the use of the farm; but I have established a large dairy, from which I market the surplus butter; and besides, the milk is a most valuable article with a large family of young negroes, and with

my present stock of milch cows, I have much more than they all can destroy during the summer season.

15th. I raise on this farm about sixty head of hogs for pork, annually; which, with the surplus sent from the mill, amounts to about one hundred head, which I have slaughtered annually, for several years past. I think every farmer ought to raise at least as much pork as is necessary for the consumption of his farm. I have no particular mode of feeding them; but keep them under good shelter during the winter, and give them as much corn as will keep them in a thriving state, until I can get the grain thrashed out of one of the fields; I then endeavor to have them shifted from field to field, until they glean the whole, by which time they are frequently good pork; my plan is never to suffer them to fall away after this, but to feed them with something until the corn gets hard enough to complete the fattening, which I always endeavor to have done by the time the weather is cold enough to have them killed. I have eighty head of sheep on this farm—my mode of feeding them is very simple: indeed, some winters I feed them not at all. If they can run on an old clover field, they will winter very well, except when there is snow on the ground, at which time I give them nice blade fodder, with an ear of corn a piece per day. I also endeavor to sow a lot of rye forward, so as to turn the ewes upon it, when they begin to lamb, which is the best food they can have.

16th. I have always penned my cattle, summer and winter, and have manured more land in this way than any other, and with less labor; taking care always to keep the pen well littered with straw or leaves from the woods, both before they are put in, and afterwards, when necessary.

17th. This question is answered in my communication to the judges.

18th. This question I consider fully answered also in my communication.

19th. This question being only answered in part, I will state that the quantity per annum is variant from fifty thousand pounds or less up to one hundred and fifty thousand, which I have saved this season. This quantity was cut from about fifty acres of land, which is three thousand pounds to the acre. My plan of curing is very simple and easy; I cut the clover and let it lie in the swath one day: as soon as the dew is a little off the next morning, I rake it up in wainrows, and let it lie in this situation until evening, when, if the day is a good one, it is sufficiently cured to put up in small shocks, in which situation it remains two days longer, when, I commence stacking or housing, as the case may be. I always haul as much to the stables as will be sufficient for my work horses and oxen. I have of late years put it up in large ricks, of fifty thousand pounds, which I have in some of my ricks this season, thached with long rye straw so as to preserve it as completely as if it were in a house or barn. Indeed, it is much easier to put it up in this way, than to put it away in the house. The mode is, simply, to make a foundation of rails, straw, or any thing else that will keep it from the ground, and go on to stack it on ten or eleven feet high without paying any other attention than to keep the middle a little rounding, and to incline a little out, so as to give the stack or rick a little bulge to prevent the rains

from driving in. I then commence the thatch, which any handy laborer can execute. The process is, to spread a layer of straight rye straw all around the stack, two or three inches thick, and sufficiently far out to form an eve with the butts out. I then go on to finish the stack or rick, by drawing in, and thatching every two feet, with the straw turned head out, after the first layer, and the straw kept as far out as it will lie on the stack, until brought to a sharp edge on the top, which is finished by tying faggots of rye straw, and straddling the top, which is confined down with a pole.

20th. I always save my own clover seed, principally by combing with hand combs, when the clover is not too much tangled for the combs to work. I have saved the seed this season from the whole of the land, from which I mowed the one hundred and fifty thousand pounds of hay, and am sure that it cannot be less than fifty bushels, and may be one hundred.

21st. I consider this question fully answered in my communication to the judges.

22d. I have never considered my management of my slaves to be correct, having always been too much in the habit of scolding, as a substitute for correction; but I have little doubt that I have always got a reasonable quantity of work from them. My first care is to see that they are both well fed and clothed, and although it is greatly to be lamented, that as they are better treated, they are apt in the same proportion to behave worse, yet I have never felt ease or content, when knowing that they were in want of either, and have therefore provided them with comfortable houses, good clothing, and a plenty of food: this, I consider not only the duty, but the interest of every master. The most difficult part of their management, is the regulation of their discipline in such manner as to ensure their observance of it, without so far cowering or discouraging them, as to render them inactive in, or indifferent about their labor; for under such circumstances, the master or overseer will find much more difficulty in obtaining from them their due, and necessary portion of labor. I seldom require of my slaves to work in the night, and am careful that they always have labor to perform within doors, in bad weather. It is a great advantage to own slaves in families, in order that the husband and wife may be always together at home. The double consequence is, that they are more comfortable and happy, and much more valuable; and besides of easier management. Under conviction of this truth, I have, by purchase, sale, and exchange, so managed, as to have but two slaves at home, who are not thus settled with their wives or husbands; and these two, are slaves which I have lately acquired, viz: only two years since.

I now submit to the committee, a detail of the nett proceeds of my farm from the crops of the two last years, viz., 1827 and 1828; the crop of the latter not having been sold, though the crop of wheat is all delivered at the mill. My crop of 1827, was as follows:—One thousand eight hundred and seventy bushels of Lawler and Mexican wheat, which brought me in Richmond, in flour, five dollars per barrel; say, three hundred and thirty-nine barrels at five dollars, delivered by my own hands, and thirty tons of plaster brought in return loads. - - - \$1,695
My crop of tobacco sold for - - - 730

I hauled from this farm this year, about five hundred loads of wood, with the teams and hands which made the crops at one dollar and fifty cents per load. - - 750

\$3,175

To this, may be added, oats sold, - \$120
Bacon and pork sold, - 120
Six hundred pounds of butter at 1s. - 100
Ten veals, sold at five dollars each. - 50

\$390

JOHN H. CRAVEN.

Communication to the Judges referred to, in the preceding Answers.

The undersigned, reports to the judges appointed by the Agricultural Society of Albemarle, to examine and report on the farms offered for premium, that he had been in possession of that part of the farm offered for the premium, known as Pen Park, eleven years; and of that part lying on the east side of the river and called Franklin, eight years. The first, or Pen Park, had been entirely exhausted for many years. As evidence of this fact, it was leased to a friend of mine in 1803, with several hands, for less than the hands would have hired for without the farm; and such was its extreme poverty at that time, that, although the lessee cultivated only the best parts of it, he was never able, although an industrious, managing Dutchman and a good farmer of the day, to raise more than three bushels of wheat to the acre. So well known was the character of the farm for poverty, that, although the mansion house was much better than is usual on lands offered either for sale or lease; yet, for several years neither purchaser or tenant could be found, and for some time, it lay out as a common. The recollection of some of you, gentlemen who have known the farm as long, or longer than I have, might supersede the necessity of further particulars on this subject. I will however, mention a conversation that occurred very soon after I made the purchase, between myself and one of my neighbors, who had been partly raised on the farm, and himself a judicious manager. "Well, I am told you have purchased the Park." "I have." "Do you ever expect to make a farm of it?" "I am going to try." "If you ever do, I will agree that I am no judge of land. It is impossible. I admit there is a part of it that you may improve, but there is a great part of the land, that has no foundation, was always poor, and can never be made rich." A gentleman who had lived on the farm more than thirty years ago, on seeing it last summer, remarked to me "Sir, you have not improved this farm—you have created it."

I will here mention to the committee that I never have had funds in hand. I have not only gone in debt for the land, but have had to get hands and stock from the proceeds of the land; which circumstance has certainly prevented me from improving as fast as I otherwise should have done.

When I purchased this farm there was only a temporary fence around the open land, and nothing like a rail or cross fence upon any other part of it. A barn standing upon eight tottering blocks, the hull of a large house, without either glass, plaster-

ing, or paint,—these, with a dilapidated dairy and a few wretched negro cabins constituted the improvements.

This being the general condition of the farm when I became the purchaser, it was my first object to get it laid off into four fields, or shifts. Its situation not admitting of the fifth shift, I was compelled to substitute that from some other part of my land, as I am never willing to cultivate a field in corn more than once in five years. But I was compelled to depart even from this order in the first round that I took, as in all the fields there was a large proportion of the land that was not worth cultivating in corn; indeed there are small parts of two of the fields that have never been cultivated in corn yet. My rotation is, No. 1, corn, seeded down with wheat, rye, or oats, and with clover the last of March, or first of April. No. 2, fallowed for wheat, and sowed down in clover in like manner the second year. No. 3, in corn, and sowed down in like manner. No. 4, fallowed and sowed down in like manner the third year. No. 5, in corn, and No. 1 in fallow. As I never fallow until after harvest, I have seldom found it necessary to sow clover in my fallow land; indeed, I have several times had my land well taken with clover after being cultivated in corn, and some of the thickest and most regular clover I had this season, was after a crop of corn. Thus you will observe each field gets two entire years rest in five, which, under a good cover of clover, and a bushel of plaster to the acre, with as much manure as the farm will produce, converting every thing susceptible of it into manure, and taking great care to get the whole on the ground before it goes through the fermentation if possible, gives a good assurance of considerable improvement. During the summer I seldom move the manure out of the stable, until the cart is ready to haul it out; and during the hot weather I prefer to have it ploughed in immediately.

That part of the farm lying on the east side of the Rivanna, of which I have been in possession eight or nine years, is divided into six fields of very unequal size. Two causes render this unequal division necessary. One is, the irregular meanders of the river on one side of the farm, while it is divided in two by a public road running directly through it; the other is, the running the fences in the valleys, that horizontal ploughing may be more perfectly done; so important in our hilly lands for their improvement, and for the greater expedition and facility of ploughing deep. And I am decidedly of opinion, that our deeper ploughing is one great cause of the advancement in agricultural improvement of this county, beyond some of those adjoining. I believe there is no one among us, at this day, who is not satisfied that the deeper he ploughs, the more his land is improved. How different from the state of things twenty years ago! when, nineteen out of twenty of the old settlers thought it would ruin the land. I have been asked the question very often, if I was not afraid of injuring the land by ploughing so deep; so far from it, I am disposed to consider that a principal cause of its improvement. There is nothing in which I am more particular, than in seeing that my ploughing is well done—and my constant directions to my ploughmen are never to fear ploughing too deep, if the horses can pull the plough. I still prefer the old bar-share plough to any other I have ever used;

considering it superior both in durability, and the ease with which it works both to man and horse.

I have now a plough of this description which has been in constant use for eight years, while I have never been able to procure any other kind that will last me two years. The great objection to the M'Cormick plough, is, that it has not strength enough for our rough lands.

It was my practice some years ago to break all my lands with four horses, but from the great disadvantage in turning and ploughing round the hill with four horses, I now work three horses only, which I think are as few as can possibly do the work well.

My long and constant practice has been to raise every thing on the farm for its support; say horses, hogs, cattle and sheep—I have on my different farms, thirty-six head of horses; thirty-two of which I have raised myself. I not only find it more convenient to raise than to purchase, but the horses are really more valuable; and it is much more convenient to sell a horse now and then, than to purchase one, when I have not the money to pay for it. Every farmer certainly has it in his power to raise his own horses. Some of the best horses I have ever owned were raised until they were fit for work, without having eaten one barrel of corn or grain of any kind. I have no doubt it will be found to be the interest of every farmer to feed all the provender he raises on the farm, to his own stock in preference to selling it; and that the farm will be much more benefited by it. I have also endeavored to manufacture as much of the clothing necessary for the use of the family, (black and white,) as possible, from materials raised on the farm; say wool, flax and hemp, the cotton yarn being purchased in preference to spinning it.

I must be excused by the committee from stating any precise amount of the nett proceeds of the farm now offered for premium, having always, without distinction, blended together the crops from my different farms: nor am I able to say precisely what force I work on these farms—It is not, however, less than eighteen steady hands, men and women, with the addition of four or five boatmen, during the season that boats are not running.

As far as I am able, I will now proceed to give a statement of my two last crops, commencing with the field No. 3, at Franklin. The crop of 1827, was seven hundred and fifty bushels of Lawler wheat, from less than thirty acres. The house, yard, and garden, stand in the middle of the field, and must occupy more than one acre. My crop of the last year from the same farm, field No. 1, containing ninety-one acres, produced twelve hundred and fifty bushels. This crop was very much injured by the rust, none of the wheat weighing more than fifty-seven pounds to the measured bushel. Ten or twelve acres of this field also were very poor, having been entirely gullied when I purchased the land; and this was the first crop made from it. My crop of wheat, rye, and oats, from the field No. 1, on the Park farm, was—wheat, four hundred and fifty bushels; rye, four hundred bushels; and, oats, five hundred bushels. This was after a very heavy crop of corn the preceding year. On this same field the present year, I have cut more than one hundred thousand weight of clover hay, from less than half the field, not having cut any except where the clover was very heavy. My constant care has been to keep every

part of my land covered with clover, and I believe you will not, at this time find one acre of my land not under cultivation, that is not pretty well covered with clover, nor is there a single acre of gullied or galled land that has not been brought under cultivation. I must here mention, what should perhaps more properly have been mentioned before, my plan of improving this kind of land, of which I have had a great deal to manage. I have always made it a point to haul as much of my straw back into the fields, as I could conveniently spare from the use of my stock during the winter, and to cover these galls or sores about twelve or fifteen inches deep, in return loads while thrashing. In this way I get at least one half of my wheat straw hauled back into the field, scarcely missing the time required for the operation; and I believe the straw thus spread upon land of this description will be much more beneficial than in any other way.

My general method of manuring, which I know is different from the usual practice, and at variance with the opinions of our most judicious farmers, is to commence manuring in the poorest spot in the field, and proceeding on in this way from spot to spot until the manure is exhausted. By this mode I have got land that would not have produced any thing, in such heart, as to be ready to receive benefit from the use of clover, and plaster—otherwise, on these spots they might have been used in vain. Again, by this mode of improving, I have generally got my fields into an uniform condition of fertility. While none is rich, it is all in such heart that I seldom sow without reaping a pretty good crop. All which is respectfully submitted to the judges, by

JOHN H. CRAVEN.

The paper marked C, referred to in the report of the judges, being Mrs. Minor's answers to the questions propounded by the judges, were withdrawn from publication by permission of the Society.

D

Answers to the questions propounded to the candidates, for the premium offered for the best cultivated farm, by the Agricultural Society of Alameda.

1st. There are nine hundred acres in my tract; about four hundred acres are cleared.

2d. It is divided into five fields, from sixty to one hundred acres each.

3d. The fields are cultivated regularly in corn, wheat, and clover: except that a part of the larger fields is put in tobacco; and about half the field intended for fallow, is left unploughed.

4th. The fallowing for wheat is done after harvest; about the 20th of September, the land is harrowed over, the wheat sown, and harrowed in by the first of October: when the seeding in corn land commences. This is prepared by cutting off the stalks and removing them, and running a single horse plough once, immediately in the row, which ploughs up the corn stubble. A large harrow is then run across the rows to level the surface, the wheat sown and put in with little Carey ploughs: a harrow or bush completes the operation, which, generally terminates by the last of October.

Oats are sown on corn land about the last of

February and first of March; clover, a little earlier. Rye, is not cultivated.

5th. Corn, is cultivated only on clover land, which is ploughed as early after seeding wheat as practicable, harrowed over in March, and listed horizontally five feet apart. The lists are opened with a coulter, and the corn planted as early in April as practicable, four or five grains in a hill, from two to three feet apart. As soon as the corn comes up, a coulter is run twice on each side of the row; the same operation is repeated with ploughs and the corn thinned to one stalk in the hill, as soon as its size will permit. After weeding, the whole interval between the rows is ploughed once or twice, before, or immediately after harvest. In planting, and every subsequent operation, the richest parts of the field are worked first, and generally about half laid by before harvest; immediately after which, the bushes, weeds, and grass are chopped out with hoes.

6th. Wheat is sown from five pecks to two bushels per acre, thicker on more fertile land, and that seeded later in the season. On fallowed land there is some allowance made for seed not buried by the harrow. It is not the object to sow that quantity which will bring the heaviest crop of a good year, but to make the crop less liable to be injured by the fly, frost and rust, (as it will ripen earlier when sown thick,) guarding against any material injury from too thick seeding in dry years.

7th. The purple straw wheat has been found most productive. The best grain is selected for seed, and cleared of the cockle by using a sand sieve to the fan, nearly as large as the sand board.

8th. The cradle is used entirely for gathering small grain, as being much the most expeditious; particularly, where hands are unaccustomed to the sickle.

9th. At the commencement of my operations, the average product per acre, was about two and a half barrels of corn, and seven bushels of wheat. It is now, about four or five barrels of corn, and twelve bushels of wheat.

10th. There are eleven laborers on the farm, viz: seven men, three boys, and one woman: day laborers are scarcely ever employed.

11th. The number of work horses is five, and almost exclusively for the plough; of oxen, six, used for hauling with the cart or wagon. These have been all raised on the farm, and two of the work horses: also, four saddle horses of fine blood, which promise more profit than any other stock.

12th. The horses are fed on clover hay, corn and oats ground, or not, according to circumstances, and cut oats straw; oxen on the same, with top fodder or shucks, but depend principally on grazing in summer.

13th. The McCormick plough is preferred as doing the best work, of the lightest draught, easiest kept in order, and cheapest in the end. Rodes' hill side plough is used on steep land, where we cannot get around the hill, and for single horses, Carey ploughs with a long wing and no mould-board.

14th. The horned cattle are 83 in number, 6 work oxen, 5 milch cows, a bull, 20 young cattle and two horses: more than should be on the farm.

15th. Hogs and pigs on the farm amount to 60 at this time, about 25 of which are for pork this fall. They are kept on the field intended for corn all the winter, and until the corn is planted, then

turned in the woods until the clover blooms, when they are put on it, and remain until the wheat is removed from the fields, where they enjoy the advantage of gleaning until the rains in September, when they are again placed in the field intended for corn. They are fed partially with corn all the year, except when in the grain fields, and are prevented from rooting in the summer, by cutting off the ends of their noses. Of sheep the number is 48. They are kept during the early part of winter on the field intended for corn, and when they commence having lambs, removed into the standing pasture, or put on clover more than one year old, where they remain until the field intended for grazing is in bloom, when they are put into it, and removed with the other stock into the grain field. But they are not suffered on any account to remain on the young clover in the fall, winter, or early part of spring, as they would entirely destroy it by eating out the bud.

16th. The horned cattle are penned during summer on some poor spot, (if convenient) in the field to be cultivated the same, or ensuing year. The bench fences used by Mr. Rogers are certainly a great improvement: but not yet adopted.

17th. The wheat straw from about 1000 bushels of wheat, most of the corn stalks from about 250 barrels of corn, and all the other forage including about 30 tons of clover hay, are converted into manure in the stable, and permanent farm pens. The quantity has not been ascertained. Most of it is applied on tobacco land, the balance on the poor spots when ploughed for wheat, oats or corn. It is considered most judiciously used where applied to wheat or oats, for the improvement of land.

18th. My experience has confirmed the general opinion of the utility of plaster of Paris, particularly when sown on clover, in March or April about one bushel per acre, or used with seed corn in planting.

19th. From 20 to 40 tons of clover hay are cut on the farm, averaging from one to three tons, per acre. The process of curing is to suffer it to remain in swath about 24 hours, when wainrows are formed by turning two swaths together; after six or eight hours sun it is put up in very small cocks, and in a day or more is ready for the rick, which is covered with wheat straw about a foot thick, this is confined by small poles tied together at the ends, and placed across the top about three feet apart. As the clover hay will not stand wet weather in cocks, it is all important to have it secured in ricks as soon as possible. When to be used a part of the rick is cut off with a hay-knife, an instrument indispensable to every farmer.

20th. The clover seed necessary for the farm, is cut with grass scythes.

21st. No other resources have been resorted to for the improvement of the farm than those it has furnished, except two or three tons of plaster used annually.

22d. In the management of negroes, the principles have been to unite humanity with discipline, and combine rewards with punishments. The details have been entrusted to an overseer. From 70,000 to 80,000 hills of tobacco are cultivated on the farm, the greater portion on new ground

E

I hope in this communication to embrace all the questions propounded by the committee of the Agricultural Society of Albemarle, to the candidates for the premium offered for the best cultivated farm.

I purchased the farm on which I reside in the year 1810. It had been cultivated previous to that time according to the three-shift ruinous system, and had been closely grazed, and large crops of corn yearly tended on it. These causes, each in itself destructive, had rendered some parts of the farm gullied, and a considerable portion of it besides so impoverished, as to be thrown out as unfit for cultivation. Its yield at that time was not more than about an average of three barrels of corn, and from eight to ten bushels of wheat per acre. I had then much to learn, and at once adopted the five shift system, which gives a rotation of wheat, corn, wheat, clover, clover, and pursued it for some time without the success in improvement desired. Experience taught me its disadvantages, and proved it to be a very slow way of improving, although every effort was made to raise all the manure possible, and to apply it in the most judicious way. The three successive crops of wheat, corn, wheat, produced too great exhaustion; the last wheat crop reducing the land almost back to the state it was in, previous to the turning in the clover and manure for the first wheat crop, besides the constant liability to washing on high land, arising from leaving the land after the first wheat crop, light, naked, or only covered with a thin stubble. For these reasons I abandoned it and have since adopted and pursued the six shift system, which gives the rotation of corn, wheat, clover, clover, [wheat, clover?] the improvement on this plan has been rapid, far superior to what it was with five shifts. The advantage of manures is clearly discovered and encourages to greater diligence in procuring and applying them. I now, as formerly, but more cheerfully, make all possible use of them. All the corn stalks, part of the straw, and all the other rough produce of the farm are converted into manure in my farm pens, which are situated near the barn and furnished with permanent shelters of plank, having a stream of water running through them in troughs. The area of each pen, is levelled and elevated a little on the borders, so as to retain as much of the liquid as possible. Of the quantity raised I can form no estimate. It is almost exclusively applied to the poorer spots of the field which I fallow for wheat, immediately before the land is ploughed, and very regularly distributed. I use plaster freely, a proof of the high estimation in which I hold it; sow it early in the spring at the rate of from four to five pecks per acre on clover, and roll all my seed corn with as much as can be made to adhere. With the aid of plaster, I make as much clover hay as I think necessary for the use of the farm, say from 50 to 100 tons, the balance is suffered to remain on the land to cover and improve it. The close grazing practised by many farmers is destructive of improvement and counteracts the benefit derived from plaster. How can it be otherwise, when the land after the application, yielded a generous return, has its whole crop of grass or clover either cut or grazed off—a crop which would materially benefit the land by laying on it. Indeed, consi-

der it as well to dispense with plaster altogether, as to have its good effects destroyed by a plan so ruinous. My clover is cut when a portion of the heads commence turning brown, is cured in the usual way, and stacked in ricks thatched with straw, or put in houses. A large quantity of my straw is hauled and spread (generally on stubble fields) so thinly as not to check the growth of vegetation, and regularly on the poorest parts of the fields. This I consider to be so valuable a mode of improving, that I might be justified in using very strong terms in speaking of its importance. It forms an admirable cover for the land—it protects the young clover, encourages and fosters the growth of all kinds of vegetables. I also improve much by penning my stock on the poorest parts of my fields. The mode of penning is, I suppose somewhat new. I have poles cut and bushed of about six inches diameter and 18 or 20 feet long. In each of these, two legs are inserted on one side and three on the other, so as to form a kind of bench, four and a half feet high. On the side of three legs, laths sawed about three by one inch are nailed to the legs about a foot apart. The benches thus prepared are put end to end, three or four or more according to the number of stock penned, and placed so as to form a square, the laths nailed on, being on the outside. The area of the pen is then covered with straw. The convenience of this pen will readily be discovered, as the pens require moving every eight or ten days. Two men and a boy may easily raise the benches and alter their position in 15 or 20 minutes. If it is necessary to move them to a distance, the two legs on one side (having been put in without wedging) may easily be taken out, the benches put in a wagon and conveyed to the spot selected, when the legs may soon be replaced, and the benches set up. One of the benches is about eight feet long, so as to be more easily moved than the rest, in order to form a convenient entrance into the pen. The above mentioned rotation and use of manure, with the mode of cultivation, soon to be described, have produced all the results ascertained; some idea of which may be formed by stating that the waste land has all been reclaimed, there is not a gully or gullied spot to be seen, and a yield safely calculated on, of from six to eight barrels of corn; and from 20 to 25 bushels of wheat, per acre, on an average. Clovertown, (the farm on which I reside,) contains about 800 acres nearly all enclosed, 300 woods and 500 cleared; the cleared land is divided into six fields averaging about 80 acres each, varying a little in size—there are besides a few grass lots. The mode of cultivation is as follows—my corn is planted from the 5th to the 15th of April on clover land, not closely grazed. The preparation is made in the fall or before the winter sets in, by first laying off rows with a coulter, six feet apart, then running a coulter furrow on each side of the rows laid off, so as to have three furrows together, to be covered by a list—this should be done very deep in order to have the ground well broke; then with a large two or three horse plough a furrow is run on each side of the three coulter furrows, barely making them meet: there will then be three surfaces thrown together where the corn is to be planted, and a good portion of vegetable matter covered, which fermenting about the time the young corn gets above the ground adds materially to its vigor and growth. In the spring I cause a

small harrow to be run lengthwise on the lists, which are afterwards opened with a shovel plough, and corn dropped four or five grains together, from three to three and a half feet apart. The intervals are then broken up as deep as possible with the coulter; they remain in this condition until the clover growing in them blossoms. The clover is hindered from flourishing by the coultering, and almost effectually secures the corn from destruction by the worm; that insect feeding on the clover until the corn is out of danger of its depredations. As soon as the corn is of suitable size, it is thinned to two stalks in a place, and weeded with a hoe, or sometimes a small iron rake is used soon after a furrow is run, with a two horse plough, on each side of the list, throwing the earth to the corn, and weeded with the hoe. When the clover is in bloom, as stated above, the whole of the intervals are broken up with a two horse plough, turning the clover as well under as possible. It is then run over with a cultivator or harrow: it may be necessary to run the cultivator over again just before or after harvest to keep it clean for seeding.

I have been thus particular as I think it very important that corn should be cultivated on clover, and not on stubble land. Independent of other advantages, such as prevention from washing and exhaustion, after the land has been well covered with clover and two or three crops well seeded, and turned in, there will be no more necessity of sowing. Corn land cultivated in this way will be a good preparation for a wheat crop, and will yield nearly as much as that on fallow. My time of sowing wheat is from the 20th of September, to the 15th of October. The preparation is made by breaking up the ground after harvest with a three horse plough, (the coulter is used when the ground has been rendered hard by dry weather) then harrowing, sowing the wheat, and harrowing it in, provided there be moisture enough, otherwise, ploughing it in with small ploughs. The greater part of my corn land is sown in wheat, the balance generally in rye. This is done if the ground is foul, by first breaking it up with a two horse plough and harrowing in the grain, or if not foul, by ploughing it in with the one horse plough. I sow but few oats, and those on corn land the last of February or first of March, clover seed about the same time. It may be as well to remark here that I consider the white flint and purple straw wheat most productive, and that I have always been very particular in selecting the best of the product of each crop for seed. Also, that in securing the wheat crop, I have about half of it cut with the sickle, on account of not being able to work to advantage where it is rank. Even where it is rank and standing up, my hands having been well practised, secure nearly as much in a day as they can with the cradle. The laborers employed on my farm amount to twelve men, two boys and two women, except a few small boys which render as yet but little service. I seldom ever hire, even in time of harvest, any day laborers. In addition to this force, I work six mules, four horses and eight oxen; two riding horses are also used. All the resources for its improvement, have been furnished by my farm, with the application of this force—a force which has expended a considerable portion of its time and labor in clearing up and improving a small farm purchased some years ago

on an adjacent mountain, and which is intended for a grazing farm.

To feed and clothe my laboring hands well—to keep them in good, dry and comfortable houses, warm in winter, and airy in summer—to be careful not to have them exposed in bad weather—I consider to be the dictate not only of humanity, but of the strictest economy. I hope this remark will be attended to. Working negroes in wet and very cold weather, affording them low, contracted huts argues to say nothing worse, a defective judgement, and a narrow and mistaken policy. Those who pursue this plan will find their hands in good weather confined by diseases, which have originated from exposure in bad.

I prefer mules to horses, when they can be got of good size; considering them longer lived, much hardier, and requiring much less food; particularly grain. My horses as well as mules are principally fed on clover hay for rack food; on ground rye, mixed with rye straw, or clover hay cut at all feeding times, except in the morning, with about four or five ears of corn previously soaked 24 hours in brine. The oxen in summer are chiefly fed on grass or hay; at twelve o'clock in the day, they have a good feed of chopped grain with cut straw or hay; in the winter, short corn with hay or top fodder. My sheep, about forty in number, are seldom fed, having good pasturage; about the time of yearning and when there is snow, they have some meal and blade fodder. My hogs are kept during the winter and spring in a woodland pasture until the clover blooms, when, their noses being cut, they are turned into the clover field and fed with one or two ears of corn each per day; after harvest they are turned into the grain fields, where they remain until those fields are gleaned, when they are again turned into the clover fields.

With respect to ploughs, I use the M'Cormick, Carey, and Barshare. I think them all good. I would prefer the M'Cormick, if it had more elevation in the throat, so as to avoid choking in rank clover.

My average crops are about 3000 bushels of wheat, 500 barrels of corn, 3 or 400 bushels of rye and 4 or 5 hogsheads of tobacco. The amount of sales from my farm in 1827, was about three thousand seven hundred and fifty dollars; in 1828, four thousand five hundred dollars.

The variety of particulars necessarily embraced in this communication, has deterred me from enlarging as much on some of them as I could wish. I am unwilling to be tedious, and shall therefore refrain from giving so fully as otherwise I might, my views, even if they could be of any avail, on the advantages and disadvantages of the different shifts and rotations of crops in general use. I believe there is much to be said on this subject; I will, however add, that, having lately purchased a farm adjoining to Cloverton, containing near 300 acres a considerable part of which is cleared, I shall change to the seven shift system, believing that preferable to the six. The latter plan allowing the first clover crop to stand only one year before it is turned in for wheat; whereas the former allows it to stand two years, which ought always to be the case, and the rotation will then be corn, wheat, clover, clover, wheat, clover, clover. I know there are objections to such a number of shifts, arising from the impression of too great a portion of land lying out of cultivation; but the strictest attention

and long experience have convinced me that those prejudices are ill-founded; and that taking ten or fifteen years together, independent of the improvement, much greater profits will be realized by the seven, than the six shifts. My confidence in this plan is such, that nothing now will ever induce an abandonment of it: unless the blue-grass should increase so as to injure the wheat and clover very materially.

JOHN ROGERS.

A GLANCE AT THE FARMING OF ALBEMARLE.

For the Farmers' Register.

The pressure of unexpected private business having a few days ago required my immediate presence in Albemarle, I gave the small portion of spare time afforded by so hurried a visit, to a very hasty view of some of the farms in that interesting region. Had my engagements permitted, it would have been to me both gratifying and instructive to have devoted as many days to this examination, as in fact I was able to give of hours; but my business compelled my return homeward to be as speedy, as the visit was sudden and unforeseen. Under these circumstances, it would be most prudent to refrain from offering to the public any of the imperfect impressions received during so short and hurried a view. But I am induced to take the opposite course, with the hope that the deficiencies may be excused, and (if merely to supply the evident deficiencies, and to correct my mistakes,) that some of the farmers of the South West Mountains may be induced to furnish to the Farmers' Register a better and more full account of the remarkable soil and excellent farming of that region. There is no part of Virginia which presents to the eye of a stranger such a combination of beauty, fertility, and peculiar qualities, as the range of "red land:"—and yet from all this rich and extensive district, embracing so many good farmers, and intelligent, well educated, and public spirited men, not one communication has been made to the Farmers' Register relating to the husbandry and characteristic features of this region. I hope this state of things will not be permitted to continue, and that even my humble effort will have some effect in stimulating to action those who can render in this way so much more important service.

It would have better directed my inquiries if I could have previously seen the reports of the premium farms, published in 1829, by the Agricultural Society of Albemarle;* but I could not obtain a copy until the moment of my departure homeward. It has since been read with a degree of interest much heightened by my having lately seen some of the farms described. But valuable as is this report, it has one defect, which is very generally found in all similar papers. The peculiarities of the soil, &c. are described as slightly as if every reader was previously well informed in that respect: and though the want of such details may not be felt by the residents of that region, it would serve to destroy the principal value of the report to strangers. On this account, my remarks will be principally directed to those peculiarities of

* The report referred to, is that which precedes this communication, in this No. of the Farmers' Register.

soil and of farming which most readily attract a stranger's notice, by the contrast to what he has known elsewhere—and will be either very concise, or omitted altogether, on the subjects fully explained in this report, to which I shall frequently refer.

The Southwest Mountains, form the most eastern range in Virginia, running parallel with the next, and far more elevated Blue Ridge. They form what may be termed the back bone of the body of "red land" which stretches some miles on both sides, of various widths and irregular outline, and running sometimes abruptly, and at others gradually into the "gray land," as the soils differently colored are called. The red soil seems remarkable for the very small portion of silicious sand which it contains, compared to the argillaceous part, or the pure matter of clay. Twice or thrice as much sand alone, would not prevent a soil being very close, 'water holding,' adhesive when wet, and intractable and difficult to manage both when wet and dry. But the red clay soil of Albemarle, is (for a clay soil) remarkable for its being permeable by rain, produces fine corn, (a crop to which stiff soils are so unfriendly,) and is not difficult to plough, if taken in a proper state as to moisture. Nor is this state rare—for the soil absorbs rain, and permits its evaporation, so readily, that it soon becomes fit for the plough after a thorough wetting. The subsoil differs very little in appearance from the upper soil, where ditches or gullies permitted it to be seen several feet below the surface. But though there seems to be so little of silicious sand in this soil, (judging altogether by appearances,) there are other ingredients which serve a better purpose in keeping the soil open. These are argillaceous gravel, and small particles of soft iron ore, or particles of earth combined with iron in some form, and forming in size and texture a sort of gravel in small and soft lumps. In a recently ploughed corn field of Mr. John Rogers' on which a heavy rain had lately fallen and swept the surface considerably, I observed in every little depression many round particles, which appeared in size and form like small shot coated with red clay. These were the particles of iron earth which, when mashed, were found to be black, or very dark within. It is the decomposition of the rocks containing iron which give to the soil its brilliant deep red color. To lowlanders, this redness of the soil at first appears as an indication of actual or approaching sterility, because their surface soil is never red, and the subsoil which is so, (though never so red as the land of Albemarle,) is made visible by being washed into galls and gullies, and is quite barren. For this reason, a visitor who first sees this land will generally underrate its worth. The whole ploughed surface of a hill-side appears like a bare and barren red gall—and there are plenty of gullies on the steep lands which have been managed injudiciously, to add to this unfavorable impression of the slight observer. Besides, the main road is generally on the lower land, and the traveller looks upwards at the fields which are on the sloping hills on each side—and this exposes every gully to full view, and keeps concealed the great extent of rich land. But much as this hilly land has been caused to wash and gully by careless management, no where is this loss of soil more easily and profitably repaired. From the ease with which naked wash-

ed galls and deep gullies have been converted to rich soil, by vegetable matter, clover and gypsum, as well as from the similarity of appearance and texture, it would seem that in fact there was not much difference between the soil at the surface, and at the depth of some feet. All this red land was naturally rich, and the mountains to their summits are as rich as the lower and more gentle slopes. Still however, their steepness near the tops, and the increasing quantity of stone scattered over the surface, render the mountain summits less profitable for tillage; and the greater part remain under their original growth of trees. Nor can the mountain steeps be made as profitable for grazing, as their richness would indicate, and as would be the case if the soil was limestone, or calcareous. The red soil is not friendly to grass in general; and in dry seasons, stock on the mountains would suffer for water as well as for grass. The adaptation of the soil to clover, which might be deemed a contradiction to this assertion, seems to be caused by gypsum, and the peculiar fitness of the soil for the action of that manure.

But rich as were the red lands originally, their general steepness, aided by tobacco culture, shallow and bad ploughing, &c. had caused a general and great deterioration of the old cleared lands, by exhausting, and still more by washing away the soil. The same system, if persevered in as long as similar causes were pursued in the low country, would have ruined these lands, if they were capable of being ruined. Fortunately, some judicious agriculturists commenced a reformation which has gradually extended through this neighborhood; and wherever it has operated fully, has served to restore richness to the surface, and to exhibit the most beautiful country that I have ever seen. The use of clover and gypsum is the main, indeed almost the sole means for this renovation—for without them, the benefits of collected manures and improved tillage would avail but little. Deep ploughing and coultering, (which seem to be universally approved, if not universally practiced,) and the use of horizontal rows for tillage, have checked the disposition of the soil to wash, and the old gullies have disappeared on the most improved farms.

As may be supposed of lands which form the slopes of a range of mountains, the red lands are generally hilly: but there are also many extensive levels through which small streams flow, and which have almost the appearance of alluvial flats, in comparison to the surrounding hills. These pieces are at least as level as any one would desire, and more productive on the average of seasons, than the richer but less safe James River low grounds. The hilliness of the surface generally, however objectionable for cultivation, adds greatly to the beauty of the landscape. Except the mountain tops, the country is generally cleared: and from an elevated position, the observer has within view a wide sweep of hill and valley, alike covered with rich crops of clover and corn, or fields now studded thickly with wheat shocks, showing an abundant harvest. The beauty and richness of the landscape more than compensate for the total absence of the sublimity and grandeur which characterize the scenery of more rugged and elevated mountains.

So much for general remark. My more particular observations (if any deserve that name) were

mostly confined to the farm of Mr. John Rogers, and a still more hasty glance at those of some of his neighbors.

I had believed from the opinions and experience of several improving farmers presented heretofore in the Farmers' Register, that wherever gypsum acted, and produced heavy crops of clover, the great means to secure the profit to the land and to its proprietor's purse, was to turn in the green clover as a manure for a succeeding crop of wheat. This was the practice here to great extent but a few years ago. But it only obtained with Mr. Rogers for one crop of wheat in his six-field rotation, in 1828, and previously, [see Report, page 231] his other crop of wheat then succeeding corn: and now he has abandoned not only his clover lay for wheat, but has adopted the four-field rotation of corn, wheat, clover, clover. This is for his Cloverton farm, and may be considered his regular system: but he has several other fields on and near the mountain top, which he cultivates as circumstances require, and under no regular and fixed rotation. It added to my surprise, while it served to confirm the correctness of the change, to hear that other good farmers in the county were changing or intended to change to this four-shift rotation, from the six-field, which has been general—viz: 1 corn—2 wheat—3 clover—4 clover—5 wheat—6 clover. The reason given was that the blue-grass increased rapidly with this rotation, and that the fifth crop, wheat, was often rendered very unproductive on account of the blue-grass becoming fixed in the clover of the previous year, and which was scarcely hurt by the usual fallow process for the clover. Another reason was, that it was found too laborious to plough under for wheat every summer and autumn one-sixth of the farm. It is considered by Mr. R. a great sacrifice of fertility to plough under clover the second year after it comes up (on the year succeeding the wheat crop) compared to letting the land have the benefit of its growth for a year longer—he does not consider the manuring by clover as less beneficial when turned in dry in the winter, for a succeeding corn crop, than when ploughed in green for wheat. The clover (notwithstanding the increase of blue-grass) is a heavy growth on the third as well as on the second year after being sown. This prevents the objection to its continuance which would generally be found in the lower country, even where good clover grows, viz. that the clover is so inferior in the third year, and has been so much eaten out by weeds, as scarcely to deserve the name of a "clover lay," for the benefit of the next crop of grain. The farmers here think that their lands could not stand the more severe cropping of Mr. Carter, Mr. Selden, and others, of three grain and one clover crop in four years, and of course, the clover turned in for wheat before it is two years old. But Mr. Carter and Mr. Rogers have each means for improvement which the other has not, or which are used to less extent. If the former takes three grain crops in four years, he also gives all his clover to the land (neither grazing nor mowing to any extent) and has all the offal of his corn crop from his embanked marsh, to increase his manure. Mr. Rogers makes and applies much manure, but less probably than the other, because he can manure so much more cheaply and effectually by giving clover plaster, and another year of the grass part of his rotation. But his clover is not

all given to the land. He mows largely for hay and for seed, and also grazes for a short time after summer is over, and when the clover is to be ploughed in. This grazing is found serviceable to break down the heavy cover, and permit the ploughs to operate more effectually; and it is not thought to retard the improvement of the soil.

The mode of cultivation of corn described in the report of Mr. Rogers [page 231] which leaves the clover to stand until in bloom, then to be ploughed in, has been found in practice to be attended with hazard. If the land becomes very dry before the clover is turned in, it cannot be done well, nor the soil be well broken, and the crop is greatly injured. Under more favorable circumstances the success was complete.

The clover was good on every part of Mr. Rogers' fields, and generally as luxuriant as I ever saw any where, except on spots very highly enriched with putrescent manures and gypsum. Such a cover he expects to be followed by a crop of corn equal to thirty-five bushels the acre, or 30 of wheat, on the best land. The land concerning which this opinion was expressed, in answer to my inquiries, was so high up the mountain that it is not likely that it had received any manure except plaster and clover—though that inquiry was not made.

It is a general practice in this neighborhood to apply the wheat straw dry and unrotted, and often fresh from the thrashing machines, as a top-dressing for the poorest parts of the clover land. It is not laid so thick as to kill the grass, and aids its growth and the fertility of the land so much, that a load of straw used in this manner, is thought much more beneficial than if it had been passed through the farm yard, in any of the usual processes of making manure. On the farm described in the report as William H. Meriwether's, (since sold to William L. Craven) I saw a piece of land thus covered with straw, from which oats, and evidently a very good growth, had been lately reaped. Yet this growth was caused by this dry top-dressing applied after covering in the seed, and of course late, on a spot so worn as to have been otherwise very unproductive. This is certainly a very cheap mode of applying the straw, independent of its alleged (and universally admitted) superior efficacy.

There is always found one striking exception to the general natural fertility of the mountains. All the ridges and points exposed to the force of the north west winds, are comparatively poor, which is supposed to have been caused by the leaves having been always blown off by the violent winds from that quarter. The east winds are generally accompanied by rain, and the leaves being wet are not carried off.

The culture of tobacco, formerly the principal object of every farm, and still so on many, has almost disappeared on the most improved and improving farms. It is considered that the constant and unremitting attention required throughout the year, by a full crop of tobacco, leaves no time and labor for the effectual improvement of the soil. My experience of the cotton crop, which also occupies nearly as much of the year, disposes me to admit the force of this objection to tobacco. It is the *leisure time* of the farmer judiciously used, that is most profitable to his land and ultimately to his income—and of leisure time, a full crop of

cotton permits but little during the year, and one of tobacco, none at all.

There is very little fixed rock showing on the surface of the mountain land, and not much of loose rock on the lower slopes. Where it is sufficiently abundant, it is profitably used to make dry stone walls for fences, which are far better than any of dead timber, or live hedges, estimating both cheapness and durability. Most of these are built by the ordinary laborers of the farm. The most extensive work of this kind, is along the main road which runs on the margin of the Rivanna River, and bounds the highly improved farm of T. J. Randolph, esq. for one and a half miles or more. This was built principally of stone quarried for the purpose—and perhaps the location alone justified the expense—as a boundary line formed by a public road passing alongside to a navigable river, cannot be altered by any operation of our laws directing the division of lands, which in most cases forbid permanent and costly modes of enclosure. The best constructed stone fence seen, (for which a regular stone mason was employed,) is on the farm of Professor Davis, of the University of Virginia.

The red lands are very favorable to the growth of locust. A few acres of suitable steep mountain side when thrown out of cultivation for this purpose, will soon be covered with this rapidly growing tree, and in ten or twelve years furnish posts of the most durable of all timber for fencing. Mr. Rogers showed me locust nurseries for this purpose, which require nothing, except to be let alone until the largest trees are fit to be cut and removed for use. Of course there will be an endless succession of the timber. He does not permit locust trees to stand singly in his fields, on account of the great trouble caused by suckers springing from the roots. For shade for stock, he prefers the black gum, which strikes down with a perpendicular root, and does no harm whatever to crops growing beneath. The high and steep calcareous banks of the lower James River, are as favorable to the growth of locust as any land in the world, and would be more profitably used for that purpose than any other. They are of but little profit for tillage from their steepness, and the continual labor required to keep down the growth of locust. Where our river banks have never been cleared however, the locust forms but a small portion of their cover: and it will be necessary to cut down all other trees, and perhaps to dig the soil and cut the locust roots, to cause the latter growth to take possession of the whole surface.

Gypsum is sown on the clover in every course of the rotation, if it is in the farmers power—though the scantiness and irregularity of the supply heretofore, have caused the use to be more limited on every farm than was desirable to those proprietors who properly estimated the value of this manure. Mr. Rogers thinks that he finds its power diminished on fields where it has been repeatedly applied—but not so much as to make the continued application unprofitable.

Lime has not been used in this particular neighborhood except in small experiments, of which I only heard generally that the results were satisfactory. Some miles eastward of, and parallel with, the range of the South West Mountains, runs the narrow strip of limestone of which so little use has been made either for cement or manure. Some

however are profiting by this treasure. A quarry is opened on the farm of Professor Blattermann, and from it he has already limed most of his land. Its appearance compared with the adjacent unlimed land of his neighbor, (the fields lying on each side of the main road to Richmond,) offers strong testimony of the benefit derived, even to the eye of a passing stage coach traveller, as I was.

The hill-side plough is very little used here, though its peculiar advantages would be no where better obtained. The reasons stated for its disuse, were the liability of this plough to be put out of order by awkward or negligent ploughmen, and that its object (the turning of the furrow slices downhill,) was nearly as well secured by the manner of using the common ploughs in breaking up land, which is to plough around each hill and knoll. When a hill rises on every side, in form somewhat like an obtuse cone, the plough may in this manner begin at the base, and by going around, plough the whole hill, throwing every furrow downward. But this convenient form of the surface is not often met with. The mountain slopes are more generally in the form of parallel knolls or broad ridges, separated by narrow depressions (or hollows) which runs up the mountain until they are gradually lost. By the plough taking the whole of one of these knolls in a single land, (even though it be thirty or forty acres in size,) and descending one of these narrow depressions and ascending another, the whole piece may be ploughed with perhaps three-fourths of all the furrow slices thrown downward. But the remaining part, where the plough crosses the ridge, the slices must be thrown upward, and, of course, the work imperfectly executed. If this crossing place is the boundary of the field, or the most suitable place for the ploughing always to cross, every repetition of the operation, will serve to increase the difficulty for the next, by increasing the steepness where the slices are thrown uphill. Besides—though these depressions form small lateral hill-sides very suitable for throwing down the slices, whether the plough is ascending or descending the general slope of the mountain, still the ascent is generally sufficient to make the labor of the ascending furrows very heavy. The great extent and irregular outlines of the lands so laid off, must also be very inconvenient, as a little work is spread along a great length, in furrows as crooked as the outlines, and necessarily passing through soils different in texture, exposure and degree of moisture, which would work better at different times and separate operations. All these objections may be cheaply avoided by the hill-side plough if I may form an opinion from my limited experience of that implement—and I have not yet found that it is very subject to be put out of order. Mine were bought of Sinclair & Moore, Baltimore, at \$10, and differ perhaps from such as are made and used in Albemarle. The hill-side plough is certainly more costly than others, and requires some little trouble to shift the mould-board: but both these objections are more than compensated by the greater ease and rapidity of the work, and its better execution, caused by every furrow being thrown down hill—besides its great effect in preventing the washing of hill-sides, by having no furrows to run in the same direction as the water from heavy rains run down the descents.

It was still more surprising to find that the mode of horizontal ploughing introduced here by the late Gov. T. M. Randolph, was no longer practiced. Another mode of horizontal ploughing, which though less scientific and accurate and far less laborious, is much better, is in general use in Albemarle—and it is also practiced by many in the lower country, who had tried and abandoned the more theoretically perfect plan. But though the same name is used for both practices, the same general direction of the rows given, and the same object aimed at, still the principle of the one is essentially different from that of the other. I do not remember whether the distinguished agriculturist who introduced this plan, published a particular description of the process—though I presume so, as he received the honorable and well deserved reward of a piece of plate from the Albemarle Agricultural Society, for the benefits which he had by this means conferred on his country. But according to the idea formed of his plan from the reference to it in Arator, and elsewhere, the principle of Col. Randolph's plan seemed to be, to plough the hill-sides in beds and water-furrows, so levelled as to retain in the furrows all the rain water that fell, and thus prevent washing. The author of Arator says hilly lands "will admit of narrow ridges as well as level, by a degree of skill and attention so easily attainable that I observed it to have existed in Scotland above a century past, under a state of agriculture otherwise execrable, and among the ignorant highlanders. It is effected by carrying the ridges horizontally in such inflections as the hillyness of the ground may require, curved or zig-zag, preserving their breadth. The preservation of the soil is hardly more valuable than that of the rain water in the successive reservoirs thus produced to refresh the thirsty hill sides, instead of its rushing to, and poisoning the valleys. This classic system of agriculture has been introduced into Virginia by a gentleman of Albemarle, in a style completely adapted to the nature of the country, and which will be copied by those who shall not be discouraged by its perfection. His ridges however are wide, whereas in the maize country, they ought not to exceed five or six feet." Eighteen years ago, according to these, and to more full and minute directions furnished in the publications of that time, I ploughed the slopes of my sandy field into horizontal beds for corn, with great care, and met with total failure, and the land washed more than it would have done otherwise. The causes of this failure were sufficiently apparent—and I attributed it to the unfitness of the plan for the sandy slopes descending from level table land, however advantageous it might be (and which I did not doubt,) on clay or stiff hill-sides, having no table land above to collect and discharge torrents of rain water over them. But the practice of the original and more perfect horizontal beds and furrows has also ceased in Albemarle, and that which is called by the same name is precisely the practice which the failure of the other compelled me and many others to adopt, and which is so simple, that (like the breaking of Columbus' egg,) it would seem that it would have occurred to every cultivator of hilly lands, without any particular one discovering or introducing it. Still I doubt not that we owe the benefit of this practice to the introduction, and trial of, and objections found to

the other: and in drawing the distinction between the plans, it is far from my design to detract from the merit of the distinguished farmer who in this, and other respects, so much aided the first improvements of agriculture in this region. Still however, it is of some importance to state the change in the operation and principle of what continues to be called horizontal ploughing, and which change is not generally known abroad to have taken place at all. The present simple plan is to break up the land level, or *flush*, and to mark off the rows for corn across the descent of the hill—not with much regard to accurate levelling, but approaching a horizontal direction so near, that the course of the running rain water shall not follow, but cross the tracks of the ploughs in tilling the crops. It is not intended to obstruct the passage of the flowing rain water—but to give it a free course across the direction of the ploughing. Mould-board ploughs are used for part of the tillage of corn: but as they are but little used, and the crop is planted on a flat surface, there are no ridges raised high enough to alter the downward course of the water, or to make dikes to be broken and swept away. This mode does not prevent washing, but greatly lessens the danger, by giving no facility for the formation of gullies. The original mode so long as it operates effectually, prevents the descent and of course the washing of rain water: but if it should ever fail, from any cause, to prevent its descent, the damage caused will be greatly increased by the very means used to guard against it.

These objections however to the original mode of horizontal ploughing are such as occurred to my mind, and were not urged by any of the persons with whom I conversed. Indeed, I have no reason to deny that the practical operation would not be perfect on these lands, if the execution of the plan was in all respects conformable to the theory. But the practical difficulties generally forbid this perfect execution—and these difficulties have caused its disuse. The main objection seemed to be that the permanency of the levelling and rows (an essential part of the original plan) would prevent the breaking up the field by ploughing around the hills, as described above: and in addition, it is preferred to lay the surface level for the crop of wheat.

The plan of hill-side ditches, or graduated trenches, to prevent washing, which has been described by Mr. Bruce and others in the Farmers' Register, has not been adopted in this region. This plan seems to me, from reason and some little experience of its operation, to be by far the best for this end—and it would suit well with the present mode of horizontal tillage. It would however require the adoption of the hill-side plough to break up the intervals advantageously.

There are other distinguished and successful improving farmers in the same neighborhood, whose names I have not mentioned because their farms were either not seen at all, or too slightly glanced at to obtain more than general ideas. There may be as good farmers—possibly better—among those, than the one whose labors occupied most of my attention. But even those persons will readily admit the propriety of placing Mr. Rogers at the head of the list of the distinguished farmers of Albemarle, as one of the first who commenced the course of improvement, and for

his success in the pursuit. He has been, from youth to old age, always a practical farmer, dependent altogether on such labors for his support and income—yet remarkable for his freedom from the prejudices which fetter the judgement and obstruct the improvement of most of those who are called practical farmers. He is said to have been throughout his life an *experimenter*—but a judicious one—always making changes in his practice, but seldom changing for the worse. He commenced life poor, and is now rich—and his wealth confers on him the only distinction which it ought ever to give to any man, and the one which any may well be proud of—that it has been acquired altogether by his own labor, skill and intelligence, and that its acquisition has been no less a benefit to his country, than to himself.

A GLEANER.

July 26th, 1834.

EFFECTS OF DARKNESS IN PRODUCING DEFORMITIES.

There is at present in Paris an artist of the Louvre, an eminent historical painter, of the name of Ducornet, who paints with his feet. He was born without arms, of poor parents, at Lille. There are also about the French metropolis a number of beggars, twelve or thirteen of them at least, all deformed in various ways, and all born at Lille, in certain dark caverns under the fortifications. The effect of these places, from their want of light producing malformed births, is so notorious, that the magistrates of Lille have issued strict orders to prohibit the poor from taking up their abode in them. It is added by the writer, that he had a conversation with Mr. Edwards on the subject, and that gentleman was greatly struck with the confirmation which the above circumstances afford to his views, stated in his work, *Sur l'influence des agents physiques sur la vie*. Mr. Edwards's experiments of detaining tadpoles in darkness, and thus causing them to grow into gigantic and monstrous tadpoles, instead of being transformed into frogs, are well known.—*London Medical Gazette*, September, 1832.

COAL TAR.—INFLUENCE OF THE FARMERS' REGISTER.

To the Editor of the Farmers' Register.

King and Queen, 19th July, 1834.

In consequence of the recommendation of a writer in the Register, I lately bought a hoghead containing 120 gallons of gas tar, which cost me ten dollars on board the steam boat at Baltimore. Before using it I was advised by the manufacturer to simmer it moderately over a slow fire for a few minutes, to drive off some volatile substance which it contained, by which it would be rendered better for painting. Just as I was about to commence applying it, a few days ago, I received a message from a friend to dissuade me from its use; saying that he had been informed it answered very well for preserving timber in water, but that it would ruin the roofs of houses, &c. This information induced me to suspend my operations with it, except on a granary, until I could hear more about it. Can you give me any information on the subject? It has a very pungent acid taste, and

likewise a taste resembling tar, and may contain sulphuric acid.

I presume it affords encouragement to editors as well as other professional gentlemen, to hear of the high approbation of their patrons in the various quarters to which their labors are extended. It affords me great pleasure to inform you that in a visit recently to the Eastern Shore of Maryland, I was pleased to find that the high estimation in which your Register is held universally in this section of the country is fully equalled there. One gentleman particularly who has fully adopted your views, in practice at least, to the most astonishing improvement of his farm, declared that he would not have taken \$100 for the first No. of the Register, in connection with your work upon calcareous manures. Your labors are exerting an influence in every part of the country bordering upon the Atlantic. Numbers who have never heard of your name, are nevertheless every year reaping a rich reward from your labors.

I was requested by Mr. * * * * * (a stranger whom I accidentally fell in with on board a steam boat) to request you to send him the Farmers' Register, at Centreville, Queen Ann's county, Maryland. The finest field of corn that I saw in Maryland, was on that gentleman's farm, which I was informed but a few years ago was one of the poorest in the neighborhood, but which has been brought to its present state of fertility by the use of marl, sea ore, &c.

C. B. F.—.

EXTRAORDINARY CALF.

A bull calf five weeks and three days old, bred and fed by C. H. Bolton, Esq. of Campden, was lately slaughtered by Mr. John Booker, of that place; it weighed 135 lbs., and was considered to be by far the fattest and heaviest calf of its age ever killed there. Its live weight on the 4th of March, was 218 lbs.; ditto on the 25th January, 100 lbs.; increase in 38 days 118 lbs. This calf in common with the rest of Mr. Bolton's stock, the offspring of a cross between the Durham and Devon breeds, which cross Mr. Bolton adopted some years back by using a bull from the stock of the Rev. Henry Berry, with Devon cows; the result of this cross has proved most satisfactory, both as to their grazing and milking qualities. This calf, up to the day he was killed, was never able to take all his dam's milk, who gives daily upwards of 16 quarts of milk of a very superior quality. The calf sold for £4.—*British Farmer's Magazine*.

BIBLIOMANIA.

From Walde's Journal of Belles Lettres.

The Duke of Devonshire purchased some time since a splendid copy of a book, entitled "Briefs and true report of Virginia; discovered by Sir Richard Grenville, knight, in the year 1585, made in English by Thomas Hariot, servant to Sir Walter Raleigh." It was printed in 1590, and cost the princely purchaser two thousand dollars. It is the only perfect copy which Mr. Grenville, from whom it was brought, had ever heard of. It is possible some of the old family mansions in Virginia, where there are many bibliographical curiosities, may possess a copy. If so, it would be well to turn it to account.

COLLEGE OF WILLIAM AND MARY.

At the late meeting of the Visitors of William and Mary College, the vacant Professorship of Law was filled by the appointment of Judge N. B. Tucker. The law lectures will now be extended to the full length of the general scientific course, which had been prevented heretofore by the circumstance of the Law Professorship being always held by an acting judge of the General Court, whose other duties made it necessary to reduce the time of delivering his lectures to about five months. This limitation greatly impaired the value of that professorship—and the change offers advantages to young men who wish to receive scientific instruction in general, as well as to attend law lectures, which the institution has never before offered, and which it is believed are equal, considered in every aspect, to what are to be found any where else.

The vacancy in the Mathematical Chair had previously been filled by the appointment of Robert Saunders, Esq. This is not an occasion to discuss the causes of these vacancies having been previously permitted to remain, nor to trace the injurious effects of this neglect of the Board of Visitors on the prosperity of the College. It is enough here to say that the College is now fully and *ably* supplied with professors, that its funds are in good and improving condition—and that steps have been taken and are in progress, which the friends of William and Mary hope will restore the institution to the high reputation which it has enjoyed, and deserved, and to the state of extended usefulness which it is capable of maintaining.

Political Economy, (the statesman's science, of which he who is uninformed ought to be ashamed to aspire either to legislate or to govern,) has long been an object of peculiar care at William and Mary. That Virginia has been the firm and resolute opposer of protecting duties, and monopoly in trade, and that we may now hope to be ultimately freed from the fetters of the restrictive system, and from the ignorant prejudices which forged them, is in no small degree owing to the light that has unceasingly been shed by this school on those who afterwards formed a large proportion of the distinguished statesmen and legislators of our country. The want of proper instruction in this subject alone, has permitted so far the reign of those false doctrines of national economy, which during their continuance have been a far heavier tax, than all the private and public expenses of education in all our colleges.

We consider our public institutions for the instruction of youth as among the first and most valuable of *internal improvements*, and heartily rejoice at the success of each and of all, without the slightest disposition to exalt any one, by the depression of another. Especially do we rejoice in the present unprecedented prosperity of our principal institution of learning, the University of Virginia. But there are enough youths in Virginia who want a liberal education, and whose parents are able to pay the cost, to furnish students for every college—and the low country alone (if sectional lines must thus be drawn) is well able to sustain William and Mary: and this institution was never in a better state to confer the benefits of educa-

tion than it will be during the ensuing course. Nor is there any reason to anticipate a falling off from this condition. The main causes for the decline of William and Mary, it is hoped, are at an end. Its interests will no longer suffer from the neglect of a majority of its Visitors and Governors, nor from the discordant views which have unhappily been entertained and acted upon by the most zealous friends of the institution: and all now concurring in sentiment and zeal to promote its prosperity and restore its usefulness, we cannot but anticipate results corresponding to such operating causes.

A SUGGESTION—THE PINE TIMBER BUG—TO-BACCO PLANT BEDS—CROWS—SASSAFRAS.

To the Editor of the Farmers' Register.

Granville, N. C. July 17, 1834.

Enclosed you will find five dollars, my subscription for the current volume of the Farmers' Register. Accept with it a farmer's thanks for the advantage already reaped from its publication, and his warmest wishes for its increased usefulness and consequent favor with an intelligent public.

By way of rendering my mite towards effecting these objects, I will offer the following suggestion, which I think if adopted, will prove serviceable to very many of your subscribers. It is that you should devise and affix to communications from correspondents recommending any thing or any plan, certain marks or symbols by which we may understand your own individual opinion of the thing or scheme recommended. It is but too true that very many things and plans are advocated with a great degree of confidence and plausibility, which, when adopted, prove seriously hurtful to the credulous and inexperienced farmer. Your own character as an enlightened and successful agriculturist is known I presume to most, if not all of your subscribers; and the adoption of this method, which will add scarcely any thing to your labor as an editor, will give us the advantage of all the valuable experience you have acquired. It will enable you to act without labor or trouble, as the special guardian of each of your inexperienced subscribers. I know no post or station in society more honorable or useful than this.*

* The plan proposed by our correspondent, or any other for the same object, would be found very objectionable. In the first place he attaches far too much value to the opinions and judgement of the editor as a farmer—and even if this error did not exist, no editor ought to be permitted thus to pass so hasty a sentence on every piece which he published. Such decisions would (even under the most favorable circumstances) serve to check that freedom of discussion which an agricultural journal ought to maintain, and besides, would be so often erroneous, as to impede, rather than advance the developement of sound doctrines and valuable facts—and would soon bring the self-constituted judge and his decisions into deserved contempt.

The same view bears, though not to the same extent, on the republication of selected articles, the soundness of the opinions and the truth of the statements of which we have been considered by some of our readers as endorsing, unless accompanied by some mark of editorial dissent. We deny the correctness of this in-

Your Orange correspondent is mistaken in supposing that it is a worm which proves so destructive to pine timber. The mischief is done by a small black bug about the size of the smallest kind of field pea. It is possible, but I hardly think true, that the bug is the parent of the worm alluded to by your correspondent. The latter is often found more than an inch long. I have never seen it in the living timber, but always in the dead. I discovered the black bug by cutting through the bark at the holes perforated by them in the living pines. They kill the tree by eating away the tender inner rind of the bark.

There is an error I think in the plan advised by Mr. Edmunds, of Charlotte, in a former number of the Register, for raising tobacco plants, which ought to be corrected, especially as Mr. E. is known to be one of the very best planters in Virginia. He recommends that the plant-bed should be grubbed before burning. I am sure the better plan is to cut down the small bushes close to the ground with an axe, and grub after burning. By grubbing in the first instance, you necessarily cover a great many grass seeds with earth so deep that the fire will not kill them. These are, by the hoeing necessary to prepare the bed for sowing, brought near to the surface, and vegetate as soon, or sooner than the tobacco seed, proving very hurtful to the young plants, and difficult to be eradicated.

If arsenic will destroy crows I know an easy plan of administering it to them. It is to bait them with corn and crumbs of bread at some place where they resort, until they go to it in numbers; and then dissolving as much arsenic in water as may be thought sufficient, mix it with meal, bake or dry it by the fire, break in small pieces, and place them at the bait. The crows will eat it without hesitation, as soon as they alight. To make them find and go to the bait early, it is best to scatter some new white corn cobs at the spot.

ference, and protest against the propriety of such a rule being applied. In presenting to the readers of the Farmers' Register the selections made from other publications, it is designed to take whatever may be most valuable—not in the opinion of one individual alone—but what may be so in the opinion of any other, whose judgement deserves to be respected. Many matters of opinion or of fact, contained in these selections, may (and often do) appear to us as mistaken or false—but it would be uncalled for and ridiculous in every such case to be presenting our opinions, instead of leaving readers to think and decide for themselves. Besides—in selecting from the latest publications, and from very remote countries, there are many statements which are either so novel, or so dependent on testimony not within our reach, that no mature opinion can be at once made up; and any other would be improper to offer. Yet to withhold these novelties from our readers because their value is doubtful, would be to keep them in the dark as to the progress of agricultural discovery and improvement. In agricultural science, as in all others, it is proper that all opinions and practices which engage attention in a considerable degree should be made known, and the true will prevail, and the false be disproved, or soon forgotten.

If the spot selected for baiting is situated so that mischief may be done by other animals than crows eating the poisoned bread, it will be best to conceal some person near the bait who may hinder the access to it of any thing besides the crows. I adopted the plan the past spring, and the poisoned bread was greedily eaten by the crows. I found no dead ones, but my farm which had been previously much infested, was quickly cleared of all but a few which I am persuaded did not eat the poison.

It has occurred to me that the best means of extirpating sassafras would be to bore a hole with an auger into the tree and deposite in it some substance which mixed with the circulating sap would destroy the vitality of the roots, as well as the upper part of the tree. Will you, or some of your subscribers, inform me what substance is likely to have this effect? I have without success tried digging them up at all seasons of the year; and I know that stock will not browse on them enough to kill them, unless in the absence of all better and more favorite food. There have been kept in one of my fields during the whole of the present year more than one hundred sheep, sixty or seventy hogs, twenty-three milch cows and work oxen, besides colts and horses, without killing (as far as I have seen) a single sassafras bush. I would willingly pay five per cent. on the cost of my land to have this pest entirely destroyed.

W. O. G.

MR. BABBAGE'S CALCULATING MACHINE.

The following details will be read with considerable interest; more especially as they set at rest the attempts which have been made in some quarters to depreciate one of the greatest projects of the age.

The Calculating Machine described by Sir David Brewster.—Of all the machines which have been constructed in modern times, the calculating machine is doubtless the most extraordinary. Pieces of mechanism for performing particular arithmetical operations have been long ago constructed, but these bear no comparison either in ingenuity or in magnitude to the grand design conceived and nearly executed by Mr. Babbage. Great as the power of mechanism is known to be, yet we venture to say that many of the most intelligent of our readers will scarcely admit it to be possible that astronomical and navigation tables can be accurately computed by machinery; that the machine can itself correct the errors which it may commit; and that the results of its calculations, when absolutely free from error, can be printed off, without the aid of human hands, or the operation of human intelligence. All this, however, Mr. Babbage's machine can do; and as I have had the advantage of seeing it actually calculate, and of studying its construction with Mr. Babbage himself, I am able to make the above statement on personal observation. The calculating machine now constructing under the superintendence of the inventor has been executed at the expense of the British government, and is of course their property. It consists essentially of two parts, a calculating part, and a printing part, both of which are necessary to the fulfilment of Mr. Babbage's views, for the whole advantage would be lost if the computations made by the machine were copied by human hands and

transferred to types by the common process. The greater part of the calculating machinery is already constructed, and exhibits workmanship of such extraordinary skill and beauty that nothing approaching to it has been witnessed. In order to execute it, particularly those parts of the apparatus which are dissimilar to any used in ordinary mechanical constructions, tools and machinery of great expense and complexity have been invented and constructed; and in many instances contrivances of singular ingenuity have been resorted to, which cannot fail to prove extensively useful in various branches of the mechanical arts.

The drawings of this machinery, which form a large part of the work, and on which all the contrivance has been bestowed, and all the alterations made, cover upwards of 400 square feet of surface, and are executed with extraordinary care and precision.

In so complex a piece of mechanism, in which interrupted motions are propagated simultaneously along a great variety of trains of mechanism, it might have been supposed that obstructions would arise, or even incompatibilities occur, from the impracticability of foreseeing all the possible combinations of the parts; but this doubt has been entirely removed by the constant employment of a system of mechanical notation invented by Mr. Babbage, which places distinctly in view, at every instant, the progress of motion through all the parts of this or any other machine, and by writing down in tables the times required for all the movements, this method renders it easy to avoid all risk of two opposite actions arriving at the same instant at any part of the engine.

In the printing part of the machine less progress has been made in the actual execution than in the calculating part. The cause of this is the greater difficulty of its contrivance, not for transferring the computations from the calculating part to the copper or other plate destined to receive it, but for giving to the plate itself that number and variety of movements which the forms adopted in printed tables may call for in practice.

The practical object of the calculating engine is to compute and print a great variety and extent of astronomical and navigation tables, which could not be done without enormous intellectual and manual labor, and which, even if executed by such labor, could not be calculated with the requisite accuracy. Mathematicians, astronomers, and navigators do not require to be informed of the real value of such tables; but it may be proper to state, for the information of others, that 17 large folio volumes of logarithmic tables alone were calculated at an enormous expense by the French government; and that the British government regarded these tables to be of such national value that they proposed to the French Board of Longitude, to print an abridgement of them at the joint expense of the two nations, and offered to advance £5,000 for that purpose. Besides logarithmic tables, Mr. Babbage's machine will calculate tables of the powers and products of numbers, and all astronomical tables for determining the position of the sun, moon, and planets; and the same mechanical principles have enabled him to integrate enumerable equations of finite differences,—that is, when the equation of difference is given, he can, by setting an engine, produce at the end of a given time any distant term which may be

required, or any succession of terms commencing at a distant point.

Beside the cheapness and celerity with which this machine will perform its work, the absolute accuracy of the printed results deserves especial notice. By peculiar contrivances, any small error produced by accidental dust, or by any slight inaccuracy in one of the wheels, is corrected as soon as it is transmitted to the next, and this is done in such a manner as effectually to prevent any accumulation of small errors from producing an erroneous figure in the result.

In order to convey some idea of this stupendous undertaking, we may mention the effects produced by a small trial engine constructed by the inventor, and by which he computed the following table from the formula x^2 by x by 41. The figures, as they were calculated by the machine, were not exhibited to the eye as in sliding rules and similar instruments, but were actually presented to the eye on two opposite sides of the machine, the number 383, for example, appearing in figures before the person employed in copying:

Table calculated by a small trial engine.

41	131	383	797	1373
43	151	421	853	1447
47	173	461	911	1523
53	197	533	971	1601
61	223	547	1033	1681
71	251	593	1097	1763
83	281	641	1163	1847
97	313	691	1231	1933
113	347	743	1301	2021

While the machine was occupied in calculating this table, a friend of the inventor undertook to write down the numbers as they appeared. In consequence of the copyist writing quickly, he rather more than kept pace with the engine, but as soon as five figures appeared, the machine was at least equal in speed to the writer. At another trial 32 numbers of the same table were calculated in the space of 2 minutes and 30 seconds, and as these contained 82 figures, the engine produced 33 figures every minute, or more than one figure in every two seconds. On another occasion it produced 44 figures per minute. This rate of computation could be maintained for any length of time: and it is probable that few writers are able to copy with equal speed for many hours together.

Some of that class of individuals who envy all great men, and deny all great inventions, have ignorantly stated that Mr. Babbage's invention is not new. The same persons, had it suited their purpose, would have maintained that the invention of spectacles was an anticipation of the telescope; but even this is more true than the allegation that the arithmetical machines of Pascal and others were the types of Mr. Babbage's engine. The object of these machines was entirely different. Their highest functions were to perform the operations of common arithmetic. Mr. Babbage's engine, it is true, can perform these operations also, and can extract the roots of numbers, and approximate to the roots of equations, and even to their impossible roots. But this is not its object. Its function, in contradistinction to that of all other contrivances for calculating, is to embody in machinery the method of differences, which has never before been done; and the effects which it is capable of producing, and the works which in the

course of a few years we expect to see it execute, will place it at an infinite distance from all other efforts of mechanical genius.—*Letters on Natural Magic, in the Family Library.*

THE GOLD REGION OF VIRGINIA.

The Rail Road Journal accompanies the following piece with a map of the gold region which it is unnecessary to offer to our readers who are acquainted with the geography of this part of Virginia, and who have access to larger and better maps. It is sufficient to copy the list of the mines now worked, and to add more full descriptions of their several localities.

The greater number of mines opened are in one neighborhood, through which passes the Rappahannock River and its principal tributary the Rapid Ann, and near their junction. These are,

The United States Gold Mine, Spottsylvania county.

Rappahannock	"	Stafford	"
Rattlesnake	"	do.	"
Culpepper	"	Culpepper	"
Millbank	"	do.	"
Virginia	"	Orange	"
Vaulcuse	"	do.	"
Liberty	"	Fauquier	"
Union	"	do.	"
Millville	"	Orange	"
I. Payne's	"	do.	"
Greenwood	"	Spottsylvania	"

On both sides of the North Anna (head waters of York River) are,

Johnson's mine,	"	Spottsylvania	"
Dixon's	"	do.	"
Tinder's	"	Louisa.	"

On the north side of James River,

The Goochland mine Goochland county.

And on the south side,

Booker's mine " Buckingham county.

The remainder of the article from the Rail Road Journal and from Mr. Shepherd's report, is copied below.

This map exhibits a condensed view of the gold region of Virginia, and is taken from a larger one belonging to Mr. F. Shepherd, of New-Haven, who has spent some months in surveying and exploring this interesting portion of our country. We say interesting, because the amount of gold annually obtained in the United States, is estimated in millions of dollars; and this amount is rapidly increasing when, comparatively speaking, the surface only of the ground has been disturbed in getting this precious metal.

We learn from Mr. S. that the undue excitement which the first discovery of gold creates in the minds of all classes, is now at an end in Virginia, and the business of getting gold is assuming a settled and systematic character. The farmer now goes on with his farming, and the experienced miner with his mining, and in this way each is mutually an aid to the other.

As to the richness of the Virginia ores, Mr. S. has given us full satisfaction, by simply pounding them in a mortar and washing away the sand in our presence, when, to our surprise, a large pro-

portion of metallic gold appeared in numerous and beautiful grains, and this, too, from specimens which had no gold visible on the outside.

The following is an extract from the report of Mr. Shepherd:

"I am decidedly of opinion that Virginia is destined, sooner or later, to become a rich and prosperous mining country; that whenever skill and capital shall be judiciously applied, (in the language of an able and beautiful writer,) she will one day be to the country what Cornwall is to England, the seat of prodigious industry, and the source of individual and national wealth.

In coming to this conclusion I do not lose sight of the great natural advantages which Virginia possesses over other mining districts in the United States, and throughout the world. It will be seen by the map that by a little more than half a day's ride, any one can be transported from the city of Washington on the Potomac, to the gold mines on the Rappahannock, on the banks of a beautiful river made navigable by locks and dams, a distance often miles to tide-water and steamboat navigation, commencing at Fredericksburg, which is a busy inland town, at all seasons supplying a plentiful market. Add to this the very low price of provisions and labor, the vast abundance of wood and timber, the great number of water powers easily created upon the numerous streams, the peculiarity of the soil and earth as affording facilities for excavation, (since steam is now applied to all kinds of digging,) and finally the beautiful development of the rich gold veins, said by those who have been observers in both countries, by far to excel Mexico, South America, or even Russia, so much celebrated of late for her gold mines. These veins are composed of quartz commonly called white flint, from one to four feet in thickness, generally perpendicular in the earth like a wall, supported on both sides by soft talcose slate, and extend from the surface to an unknown depth. It is not uncommon to find gold in the broken fragments of the veins at the surface, and it has also been found at the depth of 160 feet increasingly rich. The gold district lies in that part of Virginia between the tide-water and Blue Ridge, where the atmosphere is dry and exhilarating, the climate mild and agreeable, the water well tasted and pure, the inhabitants of that class so long and so justly famed for their hospitality and refinement, and for whose convenience, the great National or Southern Rail Road is about to pass by them as it were at their thresholds.

Still, with all these natural and extraordinary advantages, I feel it my duty, continues Mr. Shepherd, to give my friends and fellow-citizens of New England, a few words of advice by way of caution. That there is a very large amount of gold in the great state of Virginia, and that this large amount of gold may be extracted so as to afford a large profit, is clear to a demonstration; and I believe that this section of our country is worthy the attention of northern enterprise and capital. Yet it frequently happens that many persons have an idea that wherever gold is discovered, if they can but get possession of the lands, no matter at what price, their fortune is made for a certainty. This foolish impression has ruined many a man. The temptation is so great that where a person wishes to sell his land as gold land, and cannot find gold upon it, in order to effect his

object, he will sometimes bring gold sands and ores from a distance, and bury them upon his own grounds, which of course the purchaser finds out to his sorrow when too late. Again, some persons, on finding a few grains of gold, suppose that if they dig deep they will surely find the precious metal in masses and blocks. It is needless to add that such visionary day-dreams are rarely realized—still many are sanguine enough to pursue the chance with great ardor.

To those persons who engage in this business for the purpose of speculation, I would say that they will only be benefited at the expense of others, and will injure the mining interest of the country more in a few days than they can possibly repair in many years.

Finally, persons ought not to engage in this business without previous skill and experience. It is obviously unsafe for them to do so; and here is the cause of so many failures of companies and individuals. Gold mining is as much an art or trade as iron mining. What company of farmers would undertake of themselves to get iron from the ore? And what would be the probable result of such an undertaking? What would be the result if this same company of farmers should undertake to work the ores of zinc, so rich and abundant in this country? I have no doubt you anticipate the result correctly; and the same result is to be expected in their undertaking to get gold. Some persons in their ignorance suppose that if they expend a large amount, or venture a large sum, that they shall certainly realize something in return. Such visionary men lose their all, generally; whereas, in the hands of a discreet and experienced man, every cent of that money, like the well directed blows of the axeman, would be turned to a good account; and instead of a loss he would reap a reward of an hundred fold. In proof of this I have known a man to expend ten hundred dollars and get ten thousand dollars of gold for his reward, and from an examination of his lands, believe that he might labor all his life in the same prudent way, and with the same good success. Again I have known another man in the same situation precisely, expend the same sum and get nothing but a load of debt upon his shoulders instead of gold. Now will you say that these mines ought not to be worked? No, you will say let them be worked by honest, experienced and prudent men. Let this be done, and the capitalist will find his money profitably employed, and the millions of gold in Virginia will be made to circulate and gladden the hearts of millions of the human race now pining in want and "perishing for lack of knowledge."

ON WORMS AND CROWS, AND THEIR OPERATIONS ON CORN.

[The following piece was attributed, and we believe correctly, to the pen of the late John Randolph of Roanoke. The errors in our copy (and which were probably owing to the original manuscript) we have not attempted to correct.]

From the Richmond Enquirer, of May, 1830.

You may make the following addition to your agricultural news.

In some parts of the country, the young Indian corn has been totally destroyed by innumerable worms of different descriptions; such as cut-worm,

wire-worm, grub-worm, &c.: one planter on Roanoke in Charlotte county has had to plant his whole crop over again. It is doubted by some whether the enclosing system of Arator (Col. John Taylor of Caroline) can be maintained unless our Entomologists shall devise some remedy for the worms which it permits to engender, to the probable ruin of the whole produce of the earth. Until the "butterfly-hunters" or "Horned Cock Society"* shall devise a certain cure, take the following palliative ("in mitigation of damages.")—Nurse your crows and blackbirds and all birds that devour earth worms, or their *Larvæ*; of which description, the crow stands foremost, and the crow-blackbird next. That they injure corn by pulling it up, is a vulgar error that may add another item to Sir Thomas Brown's Catalogue. The writer hereof has been a planter five and twenty years, and never lost an ear of corn thereby. It is true that they sometimes destroy a roasting ear by opening the shuck, but for one thus injured by crows, hundreds are opened by wood-peckers who do not eat earth worms, but are useful allies to fruit and timber trees. Planters (they of the belting system more especially,) who have dead trees in their fields for wood-peckers to build in, are incorrigible slovens, on whom even advice (cheap as it is) is thrown away. The fact is, the crow like the dog, eats bread when he can't find meat.

While the pen is in my hand, let me remonstrate against the barbarous custom of trimming up trees into brooms by way of improvement. If the tree has obtained a tolerably large growth, the trimming or topping of any main branch is (sooner or later) certain death. Arthur Young protested against this system of *Pollard trees* in France. It is like the Abyssinian beef-steak from the live cow, or the Chinese lady's club-foot and thick.

CUTTING CORN TOPS.

From the Cultivator.

Mr. Fessenden—I have made a small experiment the past season, to ascertain the damage, if any, that results to the corn crop, from topping the stalks in the usual way. And, influenced by the request of several individuals, and the thought that, perhaps, it might lead to a better knowledge of this important branch of agriculture, (the growing of corn,) I am induced to forward the particulars to you for publication. Although I am aware that *guessing* enters largely, and perhaps necessarily, into the calculations and business of the farmer, I am also aware that experiment cannot be conducted with too much precision; indeed, that experiment to be relied on, must be conducted entirely without guessing. Therefore, I have been somewhat particular in conducting this. And lest some of your readers may be a little sceptical in regard to the result, and perhaps unwilling to allow that the course which has been pursued by our ancestors, from time immemorial, is not the best course, I will give the details; and if an apology be deemed necessary, for being so very minute, I can merely say, that as the experiment seems to me so deeply to involve the interests of corn growers, it may be well to give a detailed statement of the case, so that any interested may be able to draw their own inferences. And if, in your opinion, it is worthy a place in your useful

* See Chrysal.

journal, or likely to promote the interest of New-England farmers, you are at liberty to publish all, or a part, as you shall think best.

For a few years past, I have not cut my corn stalks until the corn was harvested, guessing that it was a course preferable to the one commonly pursued in this part of the country, of topping the stalks while in a green state. But for the purpose of settling this point more clearly, and with as little trouble as the case would admit, I selected, about the 5th of September, a row of corn in a field of about five acres, intending to take one that would average in quality equal to the field throughout, that I might at the same time be able to ascertain with tolerable certainty, the product of the whole field. The manure having been spread on the surface of the ground and harrowed in lengthwise of the furrows, and the corn planted across the furrows, made it apparently less difficult to select an average row. On this row I cut the stalks from half the hills; beginning at one end and cutting the first hill, then leaving the next uncut, and so proceeding alternately, cutting one and leaving the next uncut, through the row. I had intended to confine the experiment to this row, but finally was led to extend it so far as to include four rows, and numbering them agreeably to the order in which they were standing in the field, this row may be called No. 2. There were ninety-two hills in the row, and the stalks were cut from forty-six hills, all of them in the manner that is here termed jointing, (i. e.) cut off between the ear and the first joint above the ear. I thought they were somewhat more ripe than is usual at the time of cutting; a few of them were nearly dry. The soil was a sandy or gravelly loam, anciently covered with pine, oak and chestnut. In hoeing the corn no hills were made, but some care was taken that the surface of the ground should remain as level as possible, through the season.

My estimate of the number of hills on an acre, was made in the following manner, and if I am wrong in my calculations, I shall be corrected by some of your readers:

In an area of 200 feet square, (or 40,000 square feet,) there were sixty-two rows, with fifty-four hills to a row, making 3,348 hills. This is equal to 3,646 hills per acre, each hill occupying nearly 12 square feet of surface. There were about four stalks of corn in a hill. In estimating bushels, I have allowed the lawful weight of fifty-six pounds to the bushel.

At the time of harvesting, the corn was husked in the field. The forty-six hills from which the stalks had been cut, gave forty-eight and a half pounds of ears; and the forty-six hills on which the stalks had not been cut, gave sixty-two pounds of ears. The number of ears in the two cases was about the same; those from the uncut hills were evidently the best filled out and the most hale; on a large proportion of them the kernels were so closely wedged in, as to make it difficult to bend the ear at all without breaking it. There was very little mouldy corn in either case, a few ears were gathered, mostly from the cut stalks, but the whole quantity was so small as to make it questionable whether cutting the stalks had much effect in this particular.

Both parcels were carefully laid aside in a dry chamber for about six or eight weeks, at the expiration of which time they were again weighed,

and the parcel of ears from the uncut hills had lost in drying about two per cent. more than the other; affording some evidence that the sap continued to circulate for a greater length of time, in the uncut than in the cut stalks. The uncut hills, gave 42 lbs. 8 oz. dry shelled corn, equal to 14 oz. 12½ grs. per hill, or 60 bushels and 8 pounds per acre. The parcel from the cut hills gave 33 lbs. 7 oz. equal to 11 oz. 10 grs. per hill, or 47 bushels and 18 pounds per acre; making a loss of 12 bushels and 46 pounds per acre, by cutting the stalks. Conclusive evidence, that while the sap is in circulation, nature does not assign the stalks an unprofitable office. The product of this whole row, taken together, cut and uncut hills, was equal to 53 bushels and 41 pounds per acre.

The product of row No. 3, taken by itself, (containing ninety-two hills, on one-half of which the stalks were cut on the same day the others were,) would not show the practice of cutting stalks quite so destructive in its effects, as that exhibited in row No. 2, its whole produce was 77 lbs. 9 oz. dry corn, equal to 55 bushels and 10 pounds per acre, or 1 bushel and 25 pounds per acre more than row No. 2.

Not satisfied with resting the experiment here, I gathered the corn on rows No. 1 and 4, (i. e.) the rows each side, next adjoining No. 2 and 3, and on which none of the stalks had been cut. These rows, taken together, contained 186 hills, and their product of dry shelled corn was 171 lbs. 13 oz. equal to 14 oz. 12½ grs. per hill, or 60 bushels and 8 pounds per acre, precisely the same average yield as that part of row No. 2, on which the stalks had not been cut; this exact coincidence, however, I think may be numbered among those cases which rarely happen.

The difference between the two rows on which half the stalks were cut, and the two rows on which none of the stalks were cut, was 5 bushels 38½ pounds per acre. If this difference arose from cutting half the stalks, (and I know of no other reason,) then cutting the whole, would have reduced the crop 11 bushels and 21 pounds per acre, or from 60 bushels and 8 pounds to 48 bushels and 43 pounds per acre.

To recapitulate: row No. 2, on which the experiment was commenced, taken by itself, is as follows, viz: 46 hills on which the stalks had not been cut, gave 42 lbs. 8 oz. dry shelled corn, equal to, per acre, 60 bush. 8 lbs.
46 hills from which the stalks had been cut, gave 33 lbs. 7 oz. dry shelled corn, equal to, per acre, 47 " 18 "

Loss by cutting the stalks, per acre, 12 bush. 46 lbs.
The four rows taken together, stand as follows:
No. 1 and 4, on which no stalks were cut, gave an average of, per acre, 60 bush. 8 lbs.
No. 2 and 3, from which half the stalks were cut, gave an average of, per acre, 54 " 25½ "

Loss by cutting one half of the stalks per acre. 5 bush. 38½ lbs.
2

On cutting all the stalks, would make a loss equal to, per acre, 11 bush. 21 lbs.

The difference in the result of the two cases, is 1 bushel and 25 pounds per acre; or, in the two experiments, (if it may be so termed,) there is an average loss by cutting the stalks, of 12 bushels 5½ pounds per acre; a loss quite equal to all the expense of hoeing and harvesting, especially when we consider that in hoeing, the labor of making hills was dispensed with.

If I had cut all the stalks, and obtained a crop of forty-eight bushels to the acre, the very fact of having forty-eight bushels, would, I think, be considered by farmers generally, in this section of the country, as proof positive that the stalks were cut without injury to the crop. Or if I had gone one step farther and made large hills, at an additional expense of one dollar per acre, and thereby reduced the crop to forty-five bushels per acre, the forty-five bushels would be considered sufficient proof, that making hills (which, by the way, are usually made equally large and high on wet or dry land, without regard to soil or situation,) was labor well laid out. For although you occasionally give us a *large corn story*, swollen a little, perhaps, by *guessing* it off in *baskets*; yet, judging from what we see and know about raising corn, we call forty-five bushels per acre, a good crop.

A measured bushel, from the cut hills, weighed 57 lbs. 6 oz.—one pound less than from the *uncut*; the shrinkage being very near equal to the whole loss in weight.

If this experiment is a fair test, it seems that *about twenty per cent., or one-fifth part of the crop is destroyed, by cutting the stalks in the way they are usually cut.* If further experiment should establish this fact, I think there are few farmers that will hesitate long in deciding which is the most valuable, one acre of corn or five acres of top stalks. But this twenty per cent. is not saved at the expense of losing the stalks, they are worth as much, and I think more, all things considered, after the corn is harvested, than they are, gathered in the usual way. If after being bunched up in a green state, they heat or become mouldy, (a case of frequent occurrence,) they are utterly worthless, except it be for manure; I know of no animal that will eat them. But after they have once been dried by the frost and wind, a subsequent moderate degree of mouldiness, seems to be no injury.

The course which I have pursued with them, and for the present I know of no better, has been as follows: In the first place, they are cut off near the ground, and for this purpose a short scythe is found the most convenient instrument. The expense of cutting in this manner, however, is but a mere trifle, if any, more than cutting the stub stalks in the spring, and may with propriety be entered as an item of expense against the next crop, for which it is preparing the ground. After cutting, they are gathered into bunches of suitable size for binding, and three good sheaves of rye straw, if wet, will be sufficient to bind a ton. In gathering them up and laying in bunches, an active boy will do as much as a man. In this way, the whole expense of gathering, binding and loading, will not exceed 75 cents per ton. As they are very bulky, for want of barn room, I have them stacked near the barn-yard; and I think I may safely say, that my cattle eat more pounds of stalks from an acre gathered in this way, than they would from the same acre, if gathered in the usual way. It may be objected to this, that they

are not as good and nourishing as others; as to that matter, I am not able to say; but if the cattle are good judges in the case, (and I think they ought to be admitted as such,) they are quite as good and quite as nourishing, for they are eaten, apparently, with quite as good a relish. In addition to this, they are obtained without breaking off ears or breaking down hills in hauling out, occurrences quite frequent in the other case. They also furnish more than double the quantity of bedding for the yard, an item of no small moment in the list of "creature comforts," during our cold winters. And last, though not least, they make more than double the quantity of manure, the value of which will be duly appreciated by every good farmer, without argument. It may be said that the but stalks can be gathered after harvest, and furnish the same quantity of litter and manure as in this case; that is true; but the expense of gathering both parts in that way, from the butts being so short and inconvenient to bind, would be three times as much as it is to gather them whole. Thus viewing the subject in various points, I think this method of managing corn stalks is much better than the old one; and that a little observation and experience will convince the most sceptical, that this branch of agriculture is not yet brought to a state of perfection, that there is yet room for improvement.

In passing through a field of corn, about the first of September, I noticed that my clothes contracted a strong smell of smut, and not being aware that I had come in contact with any smutty ears, I was led to examine a little to ascertain the cause. I found many of the corn leaves nearly covered with rust (something similar to that observed on the stalks of English grain, preceding a blight,) and intermingled with the rust, was an abundance of very minute blisters of smut, or something which had the appearance and smell of smut. As I had never observed any thing of the kind before, and smut is said to be injurious to cattle, I have thought that something of this nature might have occasioned the difference of opinion, entertained by some of your correspondents, last fall, in regard to the utility of feeding milch cows with green corn stalks. Feeding cows with smutty stalks, even if "fed to the full," would probably tend to dry them up; while feeding them plentifully with healthy stalks in a green state, would undoubtedly increase their milk.

Mr. Fessenden—I was highly gratified with the perusal of the leading article in your 38th No. from the pen of Mr. Clark, on cutting corn stalks. Experiments like those he has detailed, are of great value to the farming interest, and richly entitle those who make and publish them, to the appellation of public benefactors. I beg leave to suggest the cause of the difference in the product which resulted from Mr. Clark's experiments.

There is a striking analogy between the animal and vegetable kingdoms. Food taken into the stomach of animals does not nourish, but is prejudicial to health, unless it undergoes the process of digestion. Nor does food nourish the plant until it has been elaborated by the leaves. Plants, therefore, without leaves cannot grow; but, on the contrary, if defoliated in hot weather, the unelaborated sap becomes stagnant, ferments, and de-

stroys the vitality of the plant. Thus when the tops of corn are cut, the supply of food to all the ears above the remaining leaves, is cut off, and the supply is materially diminished to those below. A diminished product must of course be the consequence.

I very much regret that Mr. Clark did not carry his experiments one step further, and ascertain the relative weight of forty-six hills cut with the entire stalks, at the time he topped his No. 2. It would have decided whether the stalks afford nutriment to the grain, after they are separated from the roots, and to what extent. This last has been my method of harvesting my crop, from an impression that I lost by it nothing in the weight of the grain, while I gained much in the quantity and quality of the fodder. The objection that the stalks mould is not tenable. They will not mould while the corn is upon them, if tied above the ears. And if not sufficiently dry when the corn is picked, they may be left in stacks till perfectly cured; and yet be housed in far better condition than they are by the ordinary mode of saving them. It is not the drying that deteriorates their value for fodder, but the *drenchings* which they get when left out till the corn is picked, and the frosts, which diminish very much their nutritive properties. If well cured, and especially if cut and steamed, cattle eat them freely, and I consider them nowise inferior to hay. The grain from the crop secured in my way, has weighed sixty and sixty-two pounds the bushel. It is a twelve rowed early variety, which I denominate the Dutton corn.

I have remarked, that the modes of planting corn, or rather the distance between the plants, is different in different states. In New England, the distance is greater than in New York, and greater in Pennsylvania than in the former. Mr. Clark's hills were four by three feet, which gave him 3,646 hills, or by my estimate 3,630, on the acre. Our Mr. Stimson plants at two and a half feet each way, and gets upon the acre 6,969 hills, or nearly double what Mr. Clark does. I once planted an acre in drills, two rows in a drill, the plants six inches apart in the rows, the rows six inches apart, and three feet between the centres of the drills, quincunx, and had, if there were no vacancies, 80,970 stalks, equal to 7,742 hills on the acre. The ground and entire product were accurately measured and weighed. While the Messrs. Pratts, of Madison, produced 170 bushels on the acre, by planting in drills, three rows in each, quincunx, thus, : - : - and four feet from the centre of the drills. If the rows were six inches apart, and the plants nine inches in the rows, the plants amounted to 43,560, equal to 10,890 hills. Assuming as data, that in all the above cited cases each plant produced an ear of corn, and that the ears averaged one gill of shelled grain, their products would be as follows, in bushels and quarts:

Mr. Clark's,	- - -	56 bushels, 13 quarts.
Mr. Stimson's,	- - -	108 " 24 "
My own,	- - -	120 " 31 "
Messrs. Pratts',	- - -	170 "

The close planting, whether in hills or drills, requires high manuring, and the two and three rowed drills, extra labor; and the ears may withal be somewhat smaller. Yet I nevertheless believe that seventy or eighty bushels may be obtained on an acre, with good manurings on a genial soil, in

our mode of planting, with about as little labor as twenty, thirty, or forty bushels, are obtained in the New England or Pennsylvania open method.

I have detailed the preceding facts and calculations, not with a view to vaunt of our skill or of the fertility of our soil, but to *show how* the large crops of corn have been raised in this state, which have been noticed in the papers.

There is one fact connected with the experiment of the Messrs. Pratts, worthy of consideration; there was not a plant missing, or deficient, in their field. They quadrupled their seed; and pulled up, as the character of the plants was developed, all but the requisite number, reserving only the strongest and most promising. It is common to see corn-fields very deficient in plants and even in entire hills. This deficiency often amounts to one-fourth or one-half.—The loss incident to this defect may readily be estimated, and greatly counterbalances the expense of extra seed, and the labor of thinning the plants.

J. B.

Albany, N. Y. April 9, 1832.

Diary of the temperature and state of the weather in July and August, observed at Shellbanks, Prince George county, 37 deg. 14 min. N. Lat. — Thermometer kept in the shade, and in the open air.

Fair or sunshine, f—cloudy, c—rain, r.

JULY.	Thermometer at Sunrise.	Weather.	2 o'clock, P. M.	Weather.	9 o'clock, P. M.	Weather.	REMARKS.
21	69	c	80	f	77	c	
22	73	f	94	f	82	c	
23	75	f	92	f	82	c	
24	78	f	95	f	80	r	
25	71	f			81	f	
26	76	f	96	f	82	f	
27	75	f	89	c	78	f	
28	73	f	86	r	76	c	
29	73	f	94	c	74	c	
30	73	c			74	f	
31	70	c			76	f	
Aug. 1	71	c	87	f	74	f	
2	70	c		r	70	f	
3	65	f	84	f	72	f	
4	63	c	84	f	72	f	
5	65	c	89	f	75	f	
6	68	f	90	f	77	f	
7	67	f	92	f	76	c	
8	68	f	93	f	78	f	
9	68	f	94	f	82	f	
10	75	f	94*	f	79	f	
11			99†	f	83	f	
12	73	f	98	f	84	f	
13		f	98	f			
14	79	f	92	r	76	f	
15	79	c	90	f	74	f	
16	66	f	80	f	64	f	
17	60	f	85	f	71	f	
18	70	f	95	f	78	f	
19	70	c		f	65	f	
20	62	f	79	c	67	f	

* 96° at 3 o'clock.

† 95½° at 2, in an open passage within the house.

COMMERCIAL REPORT.

To the Editor of the Farmers' Register.

Sir—Your unexpected call for a communication at an hour's notice, must plead an excuse for greater imperfection than usual, and brevity will consequently be a recommendation.

In the months of August and September, wheat is in Virginia the most important article of commerce. The competition which existed among the millers, as noticed in July, was of short duration, but attended with very advantageous results to the farmers. During the present month the price has been gradually but slowly declining, and \$1 10 per bushel is now an extreme price—\$1 00 to \$1 05 may in general be more correctly quoted, and some of the millers expecting a greater decline, show no disposition to extend their purchases beyond their immediate wants.

The productiveness of the wheat crop in Virginia falls greatly short of the expectations of the most-reasonable farmers. If I am wrong in estimating the deficiency at 25 to 35 per cent. no one is more competent to correct me than yourself. The price of wheat in all our Atlantic markets is nearly or quite as low as in Virginia, and not the slightest cause exists at present to induce the expectation of any European demand. How can it be expected when the price of grain in the Baltic is much below ours? Cargoes of wheat are there contracted for, deliverable on board ship, at 23s. sterling per quarter of 560 lbs. or about 2s. 6d. per 60 lbs. A decline, rather than an advance in the prices of grain may be anticipated.

The current rates of cotton and tobacco have not varied this month. The cotton crop of the United States grown last year is ascertained to be about 1,200,000 bales, of which 1,000,000 have been exported to Europe since September last. The previous year (1832) produced 1,070,000 bales, of which 867,500 were exported to Europe. That so great an increase of supply should not have caused a proportionate reduction in the value, proves the flourishing state of the manufacture in Europe—but the diminished supply from other countries must also be taken into the account.

The inspections of tobacco in Virginia, thus far, prove about 3000 hhds. less than last year, but the export will not show a similar deficiency, as the quantity manufactured at home the present year is much less than usual. The low price of grain in Holland, &c. has no doubt caused a considerable increase in the cultivation of tobacco there and elsewhere in Europe, and it is evident that the supplies required from this country are much smaller than formerly.

The pressure for money which existed during the winter and spring has ceased, and its removal may be readily accounted for. The immense sums which were required to make advances to the Western and Southern planters and merchants, the still larger ones necessary to meet the purchase of the crops of cotton, sugar and tobacco, have generally reverted to the sources from whence they were obtained. Bills which were drawn at the South have reached maturity and been paid by bills on Europe. The commercial wheel has performed its revolution. At this moment the merchant finds no active and extensive use for his funds. Every one engaged in commerce must have observed that the months of August and

September are holiday times with the merchants of the large cities, their period of recreation at watering places, or other resorts for health or pleasure.

Stocks generally have risen, and exchange also, owing to the temporary abundance of money, and to the recent change in the legal value of gold, as noted in my last communication.

Exchange on London is 106—Virginia Bank Stock 106—Farmers' Bank 102—United States' Bank Stock 110. X.

August 19, 1834.

THE FOREST PRUNER'S GOLDEN RULES.

No branches to be cut off which do not interfere with the leader; no wound, thus or otherwise made, to be larger than an inch in diameter; and no pruning in autumn.—*Gardener's Magazine.*

FARMING IN NORFOLK COUNTY.

To the Editor of the Farmers' Register.

White Plains, Norfolk County, July 1, 1834.

I have read each number of your very valuable periodical with increased delight, and must continue to do so, so long as it is a source of such useful information to the farmer. We need very much a work of the kind in this county, to guide us in our agricultural pursuits. We know nothing here from experience. Our old men are novices, and our young men the hopeless victims of *lumber getting*. We are infatuated with that potent tempter, and many hug their chains with enthusiastic delight. It will require some powerful means to break the spell, and I would to God that the Register might be the talisman. Though this business has threatened our highly favored county with destruction, yet we hope that the growing intelligence of the community, and the melancholy experience of past time, will cause us to rise in the majesty of our strength, and assert our claims to character and respectability in the agricultural world. I have persuaded many of my neighbors to subscribe to your Register, and the success that I have met with has not left me without hope. If we can get our farmers awake to their best interest, we have every thing to hope and nothing to fear: for our lands are only excelled by the western soil. They are well adapted to all kinds of artificial grasses, for we have never attempted to grow any kind, but our success has exceeded our most sanguine expectations; and as far as my limited experience will allow me to judge, plaster and lime take very well on our high sandy lands, by a judicious course of management. I would here give you some account of our system of cultivation, but the modes are almost as much diversified as the farmers are numerous. There is no fixed mode among us; and each follows his own as the best. My plan has been partly upon the drill system: first, to fallow the land with a single horse plough as early in the spring as the season will allow, in lands five feet wide and plant the corn in the ridges, (if the land is high and not likely to be inundated with water, to run a small furrow on the top of the ridge, but if low and springy, no furrow,) and plant the corn two feet apart, with four grains in each place, (though but one is to stand to secure if possible a level crop) the corn being first mixed with tar, sulphur, and

plaster, to prevent birds from taking it up. As soon as the corn gets up, the ploughs throw back the ridge by running the bar next to the corn, the hoes follow after and clean it out. We then "half hill," by ploughing every other row, with the mould board next to and as near the corn as possible; the hoes follow after, and earth the corn where the ploughs have failed to do it. We then hill by ploughing the rows that were left after the manner of half hilling. This is the plan that I have heretofore pursued, but the results have been so unsatisfactory, that I shall for the future abandon it, for some other. I like the plan of ploughing corn both ways the best: it is better suited to our convenience, most productive, and less injurious to the soil, unless in broken or very low land, where the land is injured by washing, or the land requires high ridging in order to prevent the water from overflowing it. I think I have had a good opportunity, of fairly testing the difference of the two systems. I generally allow my overseer a small piece of land for his family to cultivate on the farm where I live: he cultivates it after his plan of ploughing both ways, and to my surprise his corn has year after year been decidedly better than mine, though his land is no better, if indeed as good, and he seems to do his work with much more ease. But his is after the ancient order of laying off the corn four feet apart each way, with but one grain of corn in the hill; and better proportions I think might be adopted, and yet plough both ways. I shall not attempt to enter into the inquiry which of all the various systems of cultivating corn that are practiced with us is best. One thing is very certain, they cannot all be the best; and there is no stronger proof of the deep obscurity under which agriculture is laboring, than to see all its votaries pursuing different courses to arrive at the same destination.

You ask for information on the state of the crops generally; the corn and oat crops here, (for they are all that our farmers grow) are decidedly more promising than I remember of ever seeing them. If no accident happens it will be a year of jubilee with us, a new era in this generation, that Norfolk county will make corn enough to supply herself, and perhaps some to spare.

A. S. FOREMAN.

ON THE MANAGEMENT OF SLAVES.

To the Editor of the Farmers' Register.

Prince Edward County, 9th July, 1834.

In a country depending principally upon slave labor for its agricultural operations, as is the case with a large portion of Virginia and the Southern States generally, it would seem that a system for the general and minute management, in detail, of slaves, to be introduced into general use and practice, would be a desideratum in the economy of the country, most devoutly to be wished for; and which, so far as my observation has extended, has been as little attended to, and perhaps as little seriously thought of, as any subject of the least consequence, either in political or rural economy. The introduction of any such system, howsoever manifested its advantages might be made to appear, I am very sensible would be attended with extreme difficulty, and counteracted by such powerful opposing interests, that a moral certainty ex-

ists, that no such system can ever be introduced, but by the combined agency and influence of a very large portion of the most judicious and respectable gentlemen (and ladies too) in the country. The causes operating to obstruct the introduction of such a system, are probably much more numerous than it has been my lot to observe: and even such as have received a very large portion of my serious consideration for years, are more numerous than might be proper for me to attempt to introduce in detail, into a communication of this nature, unadorned with the grace and perspicuity which alone can attract the serious and favorable consideration of the great body of your readers.

My present object is merely to invite your attention to the subject, with a view to draw out others who may do it more justice than I possibly can, and to obtain the result of the observations and opinions of thinking people, through the medium of the Register, which being brought into general view, may result in combined efforts for the adoption of some such general system of slave management, and some such uniform manner of treating and providing for slaves generally, as the circumstances of the country will enable us to adopt, having reference principally to the agricultural interest of the country—which I feel assured would ultimately prove equally beneficial to all the honest classes of society, even so to those who would most strenuously oppose the introduction of such a system. Having introduced the subject, it might with propriety be expected I should be the first to publish my reasons for believing that such a system would be attended with benefit to the country, and to expose the existing evils growing out of the want of uniformity in the treatment and management of slaves. I should have no objection to do so, howsoever imperfectly the task might be performed, did I not in truth believe, that there are in the country, no inconsiderable number of abler hands and wiser heads, who can if they will, commence and carry forward a course of reasoning upon the subject, and introduce facts and arguments, in a manner much more beneficial to the public, than I possibly can; it being my opinion that a good start, in any business, gives generally the best prospects for ultimate success.

I will however suggest, that the intercourse, trading and dealing with slaves, which, to some extent, is too generally practiced and indulged in by free people, and in many cases by white people of unexceptionable general character, is probably an evil which has done more mischief to the slave population of the country, to the morals of both slaves and free people, and to the interests of the slave owners, and consequently to the agricultural prosperity of the country, than any other cause that has ever borne upon this subject. To do justice in portraying the mischiefs arising from this single cause, even if I were able to do it, would probably take more time and space, than would here be profitably employed. It renders the slave independent in a great measure of his master, thoughtless of, and careless in the performance of every duty, inattentive to, and even destructive to every interest of his owner, and only attentive to the means of carrying on his traffic, spending his nights in toilsome roving, and in debauchery, and from these causes, his days in a stupid inactive and utterly inefficient course of half performed labor, terminating too frequently in actual dis-

case and destruction of life, but much more frequently is the cause of severe treatment, which would otherwise be unnecessary. Our laws upon this subject are wise and good, but interested avarice covertly operating upon public opinion, has defied their execution—and laws unexecuted, are worse than no laws.

CHARLES WOODSON.

FRUIT WITHOUT KERNELS, OR SEED.

To the Editor of the Farmers' Register.

Prince Edward County,

I propose to inquire through the medium of the Register, whether the art of producing stone-fruit without kernel or seed, is known to any of your readers—and if such art be known, what is the process by which this very desirable object can be effected. I have twice known late frosts to destroy the greater portion of the kernels in peaches, leaving some unaffected, which produced the fruit in every respect as common, with stone and kernel perfect, whilst the greater part of a sparse crop, came to perfect ripeness, with very small stones, which were generally cleft in the growth, and without kernels, and were incomparably more delicious: indeed so much more delicious, that the fruit having no kernel, growing on trees which generally bore very indifferent fruit, scarcely eatable, was found much more delicious, than the fruit with perfect stone and kernel, grown on trees that generally bore very fine flavored fruit.

CHARLES WOODSON.

ILL EFFECTS OF THE TRANSPLANTATION OF TREES.

To the Editor of the Farmers' Register.

Prince Edward County,

I submit for the consideration of your readers the inquiry, or doubt whether orchards, or fruit trees to any large number, ought ever to be transplanted in any soil. But knowing that much may depend on the soil, and particularly upon the substratum, I should like to see published the opinions of others, who have attentively observed the growth and manner of trees, raised in the different modes of transplanting, and from seed planted where the tree is to stand and grow for life. This suggestion is made with special reference to the larger kinds of trees, which take years to bring them into mature bearing, and should be expected to live long, to reward the expense and trouble of rearing. My own observations, for not less than forty years, have confirmed the opinion which I have entertained for thirty-five years, that upon such soil as is common in Virginia, from tide water to the Ohio River, no trees of large growth ought ever to be removed from the places where the seed came up, or be transplanted, except for some particular purpose, such as the introduction of new or desirable kinds, or the removal from places inconvenient or improper for them to grow in, to other places more desirable. The difference in the time it will take to raise orchards to good bearing state, by the different modes of transplanting, or by planting seed at once in the orchard, and grafting or budding on the young trees, is perhaps much less than would be supposed, when

we consider that it generally takes several years to raise young trees in the nursery, to the largest size fit for transplanting. But the advantages in favor of the tree which grows to full maturity where it came up from the seed; it appears to me are manifestly greater than those obtained by bringing a transplanted orchard somewhat earlier into bearing. There is no fact better established by experience and observation, than that seedling trees, even when transplanted, are much more vigorous, and outlive grafts; and my observation leads me to the conclusion, that seedling trees which stand where they came up, as much outlive those seedlings which have been transplanted, as the latter outlive transplanted grafts; and I am inclined to think, that no grafted or budded tree is ever as sound and healthy as a seedling tree, or one the roots and branches of which are all of the same kind. I have scarcely ever noticed a budded tree, the wood of which did not become doated earlier in life than seedling trees of the same kind generally do. I would not however have it understood, that I consider it improper to transplant all such trees as may be convenient, or desirable for use or comfort, to obtain any necessary supply of fruit, a few years earlier than it could be raised by planting the seed. The history of my observation and experience, follows. About the year 1784, my father planted out an orchard of grafted trees, apples and pears. For several years the young trees prospered and grew rapidly, till about the year 1790, when they began to die in every part of the orchard. It was made my business, though a small boy, to dig up the dead trees in the orchard, to trace every root that could be found, and remove entirely out of the orchard, every fragment of root that could be traced to the greatest depth and extent to which the roots had ramified. This operation continued from year to year, till about the year 1800, when a number of apple trees died, and were thus taken up, some of which measured near a foot in diameter. There was never a root found by me, which had penetrated more than about a foot deep in the ground. It had also been made my business, to raise seedling nurseries of young apple trees, and to dig them up when about the size of large goose quills, to be used as stocks for hand grafting, to be planted out again, after being grafted, for the purpose of raising grafted nursery trees, to replenish the orchard. Sometimes when I wished to hasten the growth of my young grafts, I dug up the seedling stocks, about as large as goose quills, with all the tap roots that could be obtained by digging to the greatest depth that the tap roots had penetrated the substratum, and generally found that they had descended about twenty-seven inches, and in a few cases thirty-six inches. This led to the conclusion, that the tap root once cut, never attempted to grow downward again, or if it did attempt to grow downward, its efforts were too feeble to penetrate, even a moderately hard substratum: that tap roots growing so deep from small trees, must go much deeper from large trees, and steady and support them greatly against storms, as well as to render the tree more healthy, by enabling it to sustain uninjured the severest drought, particularly where orchards have been planted upon hillsides, and from the necessary tillage of the earth, the surface will be washed and removed downhill, gradually leaving the extended roots of the trees exposed near the sur-

face, to suffer greatly in dry seasons. I would not advise to plant trees on hillsides, but a great many people must plant them there, or not have them at all—neither would I advise to plant on perfect level land, upon which, or in which, the water would be retained, so as to sob the land, and injure the roots of the trees.

CHARLES WOODSON.

GRUBS OR BOTS IN HORSES—AND COLIC.

To the Editor of the Farmers' Register.

Prince Edward County,

I am aware that the popular prevailing and almost universal opinion is, that bots or grubs in horses, frequently cause their death by eating through their stomachs. Erroneous as I certainly think this opinion, I should abstain from controverting it, in consequence of the very numerous and respectable witnesses who have united in asserting it to be a fact, that they have frequently seen the stomachs of horses perforated by the grubs, to a perfect riddle, passing themselves, and letting out the contents of the stomach into the chest of the horse, were it not that I think it the duty of every man in society, to controvert what he verily believes to be injurious error, at the least, by giving his reasons for being of a different opinion. I have seen many horses opened that were thought to have been killed by grubs, and examined the intestines of several with very great care and attention. With the solitary exception of a single grub, I never saw one fastened upon any part of the intestines, except in a *short canal or passage between the upper and lower stomach*,* frequently lining the whole passage to overflowing, where they insert their heads into the membranous fleshy substance of the canal, which is much thicker than the coat of the stomach, forming cells like honey comb, but never passing through: nor does it appear that they ever let go their first hold, till they arrive at full maturity, and are ready to pass off, and be discharged with the excrement, unless they should be forcibly detached, which is sometimes, but rarely, the case. Where a number of full grown grubs have detached themselves all nearly from one spot, leaving some smaller immature grubs scattered about, and not so deeply settled, they sometimes get rubbed off by the passage of rough food, and sometimes, but very rarely, are found mingled with the food in the stomach, and by possibility may fasten again on some other part of the intestines. In the single instance noticed above, I saw a grub fastened on some part of the stomach, where he had made a pretty deep cell, but had not penetrated more than half through, the stomach seeming to have swelled and thickened considerably at that point.

Some years past I lost a valuable horse, that upon examination certainly died by hoving or bursting of the stomach, occasioned by being carelessly starved, and then full fed with as many dry clean oats as he would eat. Upon opening him for examination, there were present three or four white men, and eight or ten grown negro men, who all with one accord, declared that the grubs had eaten his stomach to a perfect riddle, and let

* I am not very certain, (relying on memory alone) of the precise location of the grubs.

out a portion of the food and grubs into the chest; the white men were so fully satisfied that the grubs had eaten through the stomach, and killed the horse, that I could not prevail upon them to remain till I had examined farther to my satisfaction, which I did alone, and found that the holes which they thought had been eaten by grubs through the stomach, were occasioned by the swelling of the food in the stomach, which burst it open in that manner, the parts giving way and opening in a kind of net work, showing on slight examination, the appearance of holes eaten through by grubs, and through the largest of which holes, a portion of the food, and some two or three grubs had passed out. I had before that seen like openings, not quite bursted through the stomach of a horse, that had no grubs in him, and was supposed to have died with colic. If it be the fact, that grubs do not destroy horses by eating through their stomachs, of which I am as certain as of anything not positively known, it follows of course, that very sick horses in imminent danger of speedy death, need never be treated with any view to destroy or remove grubs, even if medicines were known of certain efficacy in their immediate removal or destruction; but experiments frequently tried, demonstrate the fact, that grubs cannot be killed by the administration of any medicine, that would not certainly kill the horse. I have immersed them for twenty-four hours in spirits of turpentine, ardent spirits, in camphorated spirits, in oil, and various other infusions, none of which destroyed life in grubs of any size, from small maggots to full growth,—which facts and opinions taken together, are sufficient to demonstrate the propriety of treating very sick horses, with the view to cure some other disease, which may most commonly be considered colic in some form, to cure which there is never any lack of doctors, scarcely any two of whom agree in their use of the same remedies. Nevertheless, it will not be denied, that different remedies may be good in the same disease. The most generally successful practice which has fallen under my observation, when horses have been very sick apparently with colic, is to drench them immediately with a quart or more of very strong soap suds, of old soap if to be had—the suds made quite thick and ropy, and to be given lukewarm; and soon as possible bleed freely, and throw up an injection of a strong decoction of tobacco, say two quarts, milk warm. This relaxes the whole system, and should the horse recover, he should by all means be permitted to rest till his strength shall be certainly recruited. In case the horse swells, with indications of speedy death, the last remedy is to stab him with a trocar and canula, if to be had, or a knife four or five inches deep, in a right line exactly half way between the left hip bone and the lower end of the short-rib, turning the point of the instrument a little forward and off from the loin, in order to avoid striking the kidney and be certain to perforate the large intestine which presses against that part of the flank. If a knife is used for stabbing, it will be proper to have a tube of some kind, made smooth and inserted into the orifice as soon as the knife is withdrawn, in order to let out the wind, the free escape of which, is frequently prevented by the closing of the orifice in the flank, and by a change of position, bringing the orifice in the intestine to press against some other part, and thus prevent the escape of

air from the intestine: (Judge Peters' remedy.) If a tube is used, such as a large reed or small elder, it is proper to fasten a strong string securely round the outer end, by which it should be held to prevent its slipping into the chest of the horse, which may be done by any other convenient means. A large quill cut half way through at the upper part of the barrel, and the lower end cut off makes a tube that will answer the purpose, to be held by the feather end. I have stabbed a number of horses with invariable success, and apparently no injury. After a horse has been attacked with colic, particularly if relaxing medicines have been used, and especially if the decoction of tobacco has been injected, he should be put into a dry house large enough for him to wallow without injury, and a plenty of soft dry litter should be spread on the floor. He should not be permitted to get wet or run out of nights for several days. It is not improbable, I should think it certain, that grubs do great injury to horses, by impairing their general health, and increasing their liability to severe attacks of colic, &c.—wherefore if any means can safely be used to prevent their propagation or to expel them it might be well. Frequent rubbing the horse with a greasy cloth in nit season on the parts where the nits are fastened is strongly recommended, as well as scraping off the nits, and killing the nit flies. A free use of dry pounded rosin two or three times a week, well mixed with the food, has been recommended by a person who kept horses in very fine order.

CHARLES WOODSON.

[The views above respecting bots, are sustained by the following article from one of the latest English publications on the diseases of horses.]

BOTS IN HORSES.

From the Farmer's Series of the Library of Useful Knowledge.

In the spring and early part of the summer, horses are much troubled by a grub or caterpillar, which crawls out of the anus, fastens itself under the tail, and seems to cause a great deal of itching or uneasiness. Grooms are sometimes alarmed at the appearance of these insects. Their history is curious, and will dispel every fear with regard to them. We are indebted to Mr. Bracy Clark for almost all we know of the bot.

A species of gad-fly the *æstrus equi*, is in the latter part of the summer exceedingly busy about the horse. They are observed to be darting with great rapidity towards the knees and sides of the animal. The females are depositing their eggs on the hair, and which adhere to it by means of a glutinous fluid with which they are surrounded. In a few days the eggs are ready to be hatched, and the slightest application of warmth and moisture will liberate the little animals which they contain. The horse in licking himself touches the egg, it bursts, and a small worm escapes, which adheres to the tongue, and is conveyed with the food into the stomach; there it clings, by means of a hook on either side of its mouth, to the cuticular portion of the stomach, and its hold is so firm and so obstinate, that it will be broken before it will be detached. It remains feeding there on the mucus of the stomach during the whole of the winter, and to the end of the ensuing spring; when, hav-

ing attained a considerable size, and being destined to undergo a certain transformation, it disengages itself from the cuticular coat, is carried into the villous portion of the stomach with the food, passes out of it with chyme, and is at length evacuated with the dung.

The larva or maggot being thus thrown out seeks shelter in the ground, contracts in size, and becomes a chrysalis or grub; in which state it lies inactive for a few weeks, and then, bursting from its confinement, assumes the form of a fly. The female, becoming impregnated, quickly deposits her eggs on those parts of the horse which he is most likely to lick, and so the species is perpetuated.

There are several plain conclusions from this history. The bots cannot, while they inhabit the stomach of the horse, give the animal any pain, for they are fastened on the cuticular and insensible coat. They cannot stimulate the stomach and increase its digestive power, for they are not on the digestive portion of the stomach. They cannot, by their roughness, assist the trituration or rubbing down of the food, for no such office is performed in that part of the stomach—the food is softened, not rubbed down. They cannot be injurious to the horse, for he enjoys the most perfect health when the cuticular part of his stomach is filled with them, and their presence is not even suspected until they appear at the anus. They cannot be removed by medicine, because they are not in that part of the stomach to which medicine is usually conveyed; and if they were, their mouths are too deeply buried in the mucus for any medicine, that can safely be administered, to affect them; and, last of all, in due course of time they detach themselves, and come away. Therefore, the wise man will leave them to themselves, or content himself with picking them off when they collect under the tail and annoy the animal.

BLASTING ROCKS.

From Goodsell's Genesee Farmer.

As many lives are yearly lost by the untimely explosion of the powder used for blasting rocks, humanity prompts us to give a process as we heard it described a few days since, by a person who had been injured in a mine where many accidents of the kind had happened which led them to try other methods of charging the rocks than those commonly practiced and which he said ended in the discovery of a safe and expeditious manner of blasting. As these accidents had uniformly happened, in what he denominated the "tamping" or driving down the brick and other substance used in filling above the powder, they for an experiment, substituted plaster of Paris, which had been heated, as for preparing cement, which they mixed with water in the same manner, and poured the cement into the hole upon the powder, having first introduced the quill or fuze; the cement immediately set or hardened when the blast was ready for firing. He said that he never knew a blast managed in this way to fail of doing well, and never knew an accident happen; that it was quicker done and was more economical in every respect. If this should prove correct it should be generally introduced.

GRADUATES OF THE UNIVERSITY OF VIRGINIA.

The tenth session of the University of Virginia closed on the 19th July, when Degrees and Certificates were conferred on the following students, who had been admitted by the Faculty to these honors in the several schools and classes mentioned below. The names are placed in alphabetical order.

SCHOOL OF ANCIENT LANGUAGES.

In Latin Language and Literature.

Septimus D. Cabaniss, Demopolis, Alabama.
Tully R. Cornick, Princess Ann.
Benjamin J. Darneille, Albemarle.
Jacob D. Dudley, Richmond.
William T. Early, Orange.
John M. Forbes, Falmouth.
John M. Gardner, Washington city.
John B. Lynch, Tennessee.
Augustine S. Magill, Winchester.
Thomas L. Patterson, University of Virginia.
David H. Tucker, Jefferson.

In the whole School of Ancient Languages, (including Latin and Greek Languages and Literature.)

Thomas T. Bouldin, Charlotte.
Peter Carr, Albemarle.
Archibald Cary, Fluvanna.
Frederick W. Coleman, Caroline.
Beverly Jones, Mecklenburg.
Thomas Leigh, Halifax.
John A. Meredith, New Kent.
Charles D. Morris, Caroline.
Charles H. Randolph, Richmond.
Edmund Ruffin, Prince George.
Francis S. Sampson, Goochland.

SCHOOL OF MODERN LANGUAGES.

In French Language and Literature.

Peter Carr, Albemarle.
Archibald Cary, Fluvanna.
James H. Davis, University of Virginia.
Nathaniel Harrison, Amelia.
Augustine S. Magill, Winchester.
Robert Patterson, University of Virginia.
John W. Stevenson, Richmond.
Thomas B. Washington, Jefferson.
Thomas L. Patterson, University of Virginia.

In Spanish and French Languages and Literature.

James H. Davis, University of Virginia.
Fayette Robinson, Richmond.

In Italian Language and Literature.

Augustine S. Magill, Winchester.

SCHOOL OF MATHEMATICS.

William B. Archer, Richmond.
J. B. Lynch, Clarksville, Tennessee.
Andrew R. McKee, Charlottesville.
George G. Minor, Albemarle.
Francis S. Sampson, Goochland.
Robert W. Tomlin, Hanover.

SCHOOL OF NATURAL PHILOSOPHY.

William B. Archer, Richmond.
Thomas T. Bouldin, Charlotte.

John C. Burrus, Huntsville, Alabama.
John H. Christian, Henrico.
Frederick W. Coleman, Caroline.
Benjamin J. Darneille, Albemarle.
Jacob D. Dudley, Richmond.
John M. Forbes, Falmouth.
Washington Van Hamm, Zanesville, Ohio.
John W. Harris, Nelson.
Walter D. Leake, Goochland.
Andrew R. McKee, Charlottesville.
George G. Minor, Albemarle.
William W. Minor, Albemarle.
George L. Nicholson, Middlesex.
Moses M. Pailen, Richmond.
Micajah Pickett, Meadville, Mississippi.
Zebulon M. Pike Powers, King and Queen.
John W. Stevenson, Richmond.
David H. Tucker, Jefferson.
William S. Triplett, Richmond.
Overton D. Watson, Albemarle.
John T. Winn, Adams county, Mississippi.
John S. Woods, Albemarle.

SCHOOL OF CHEMISTRY AND MAT. MEDICA.

In Chemistry.

Alexander L. Beard, Loudoun.
Thomas T. Bouldin, Charlotte.
John H. Cochran, Loudoun.
Robert J. Davis, Lynchburg.
John G. Fulton, Augusta.
John W. Harris, Nelson.
Richard J. Harrison, Sussex.
Augustine S. Magill, Winchester.
John A. Meredith, New Kent.
William W. Minor, Albemarle.
Charles Minor, Louisa.
Zebulon M. Pike Powers, King and Queen.
Charles H. Randolph, Richmond.
Edmund Ruffin, Prince George.
John R. Woods, Albemarle.
John B. Young, Henrico.

SCHOOL OF MEDICINE,

With title of "Doctor of Medicine."

William A. Baynham, Essex.
Alexander L. Beard, Loudoun.
David N. Bliss, Connecticut.
Thomas J. Pretlow, Southampton.
Edwin H. Smith, Richmond.
Jacob Alonzo Smith, Henrico.
Thomas Withers, Dinwiddie.

The following Students received Certificates of Proficiency in Medical Jurisprudence:

James H. Davis, University of Virginia.
Willim Frazier, Augusta.
Hudson S. Garland, Nelson.
George P. Holeman, Fluvanna.
Archibald T. E. Robertson, Richmond.
John W. Stevenson, Richmond.
Nathaniel A. Venable, Prince Edward.

SCHOOL OF MORAL PHILOSOPHY.

Archibald Cary, Fluvanna.
Frederick W. Coleman, Caroline.
James H. Davis, University of Virginia.
Washington Van Hamm, Zanesville, Ohio.
Thomas T. Land, Rankin, Mississippi.
John B. Lynch, Clarksville, Tennessee.
Augustine S. Magill, Winchester.
John A. Meredith, New Kent.

Charles Minor, Louisa.
Moses M. Pallen, Richmond.
Thomas L. Preston, Washington county.
Charles Randolph, Richmond.
Edmund Ruffin, Prince George.
Frances S. Sampson, Goochland.

The following Students received Certificates of Proficiency, in Political Economy:

John H. Christian, Henrico.
James H. Davis, University of Virginia.
John W. Stevenson, Richmond.
Thomas B. Washington, Jefferson.

SCHOOL OF LAW.

Wm. H. Brockenbrough, University of Virginia.
James L. Carr, Albemarle.
William Frazier, Augusta.
Burwell G. Garth, Albemarle.
William Martin, Henry.
John B. Minor, Louisa.
William M. Randolph, Powhatan.
McClurg Wickham, Richmond.
John B. Young, Henrico.

The following gentlemen have attained the Degree of *Master of Arts of the University of Virginia*—the highest honor which the institution can confer—and that requires the Student to have previously graduated in the Schools of Ancient Languages, Modern Languages, Mathematics, Natural Philosophy, Chemistry, and Moral Philosophy.

John H. Cochran, Loudoun.
James H. Davis, University of Virginia.
John A. Meredith, New Kent.
Charles Minor, Louisa.
Charles H. Randolph, Richmond.
Edmund Ruffin, Prince George.
John B. Young, Henrico.

ESTIMATES OF THE EXPENSES AND PROFITS OF REARING SLAVES.

[Written in 1832.]

For the Farmers' Register.

The great question of the effects of slave holding on the prosperity of the people of Virginia, has lately occupied the attention of every citizen: but long as the subject has been debated, and numerous and oft repeated as were the arguments and estimates presented, still the existence of slavery was considered only as to its effects on the welfare of the community, and not on private and individual interests. A party question was raised—and whether it was treated in its political, moral, or religious bearings, partizan feelings entered into, and governed both sides of the discussion. Neither truth nor reason can be expected on any subject, from arguments and debates so influenced. No one more than myself condemns the manner in which the debate on this subject was raised and conducted in the Legislature of Virginia: and as an owner of slaves, (and one whose income is derived almost entirely from their labor,) I assert an unquestionable right to my property, and protest against every attempt to deprive me of it without my consent. But at the same time, it may be both proper and expedient, that we who hold this property, and contend for these rights, should ex-

amine for ourselves what is the true amount and value of the pecuniary interest of each slave holder, and properly estimate the worth of what we are contending for. The general interest is only the aggregate of all the individual interests—and to arrive at the truth respecting both, a little arithmetic will aid us more than volumes of declamation. I ask the attention and assistance of those who are like myself interested in this kind of property, in the attempt I shall make to estimate the cost of rearing slaves, and the market value thence derived. I shall endeavor to avoid all the other considerations, important as they are, that press upon this subject—and without meddling with politics, or morals, mine will be the more humble object to ascertain how far the private individual interests of farmers are concerned—and by the same mode, and on similar grounds, as the profit or loss of rearing live-stock of any kind would be estimated. The consideration of slave holding as a matter of agricultural finance, is presenting the subject in a form that may be disgusting to many, and repulsive to all. Nevertheless, it is the only correct mode for establishing the truths I seek, or of erecting a sure and solid foundation for the discussion of the general question.

The rearing of slaves in Lower Virginia has so generally been considered a source of profit to their owners that it has scarcely been questioned or doubted. But I have never known any proof of the fact exhibited, nor even sought for. A few female slaves, in the course of twenty-five or thirty years, will often yield an increase of eight or ten times their number, and as great a multiplication of their own first value—and the great augmentation of capital in such cases, is taken as sufficient evidence that great profit has been thence obtained. Yet nothing is more fallacious than deductions so made. An estimate of profit or loss might however be obtained, with sufficient accuracy, by using the following data: 1st. The cost in purchase money, or the value of the mother, and the annual cost of maintenance of herself and children, for a certain length of time. 2nd. The market value of the slaves at the end of that time—and 3d. The average probability of the continuance of life during the same time.

Money may be lent on good security for 6 per cent. interest. If a man vests his money in trade, or in building houses for rent, and thereby obtains 10 per cent. only 4 per cent. is the amount of his profit for the risk and trouble attending his investment; as the remainder was the fair value of his money. If the whole average annual returns from his new business amounted to no more than 6 per cent. there would be no profit whatever, and no man knowingly would vest his money so uselessly, if there was in this business more trouble or risk, than in making ordinary loans.

The net hire of a slave shows what is the value of his labor to his employer, and to his owner. The price for which he would sell shows what amount of capital is so vested. If the demand for the labor of slaves was limited to one district, the prices of hire and of sale would always bear a fair proportion to each other. But the price of hire marks the value of labor here, while the selling price is fixed by the demand of Alabama or Louisiana—and therefore the two may be quite disproportioned; and the selling price being now regulated by the far greater demand, must of necessity

greatly exceed the hire, which is founded on the less demand for labor at home.

From these plain and indisputable premises, it will follow necessarily, that a monied capital vested in slaves, and those slaves hired out, can yield no profit whatever. It is true that no man ever thought of so using his money: but that does not affect the result of the argument. If it would be *unprofitable* to make such an investment of money, it is equally unprofitable to keep it so vested, as is done in thousands of cases. Nor is the truth of the principle effected by the owner's retaining the slaves in his own employment, instead of hiring them to others. He may thereby insure their being treated more humanely, but will not obtain much more profit, for it is certain that those who hire slaves, on the average pay more than a fair price. It should be observed that I allude altogether to slaves employed either in field labor, or otherwise on our farms. The value attached to particular slaves for their moral or mental qualities, or as domestic servants, has nothing to do with the question.

I will now proceed from general to particular estimates. The first presented will be a case of the simplest kind, viz: a female slave without children, and whose value and services are not affected by child-bearing. On this supposition a young woman of eighteen or twenty years, would sell for \$300, and would bring the unusual high annual hire of \$18, or the bare interest on the purchase money. At these rates, it would require that her life should be not only without infirmity, without disease, (or the cost of it, in physician's bills,) but also *without end*, to yield the common profit of capital to her owner. It requires no farther detail to show that holding such property must be attended with certain loss. But for the purpose of aiding other estimates, let this be considered in another point of view. Suppose the average life of this woman, fit for labor and free from infirmity, to be twenty years; or to continue to thirty-eight or forty years of age. This must be ample allowance, as her expensive old age is a fair deduction from a longer continuance of her more profitable years. Then to avoid bringing loss to the owner, her annual hire, clear of all expenses, should not only pay the interest on \$300, but also as much more as would suffice to repay that amount of capital, by annual payments for twenty years. The sum necessary for both these purposes, (estimated by the rules for fixing the value of annuities,) would be about \$26 50—which if received in annual net hire, would reimburse the owner, but not leave a cent of profit. But according to the foregoing supposition, the annual hire would fall short of that sum by \$8 50: and that loss for twenty successive years, would be equal to \$97 40 deducted from the first value of the slave, or nearly one-third of the capital so vested.

Let us next suppose the far more common case that the female slave at the age of eighteen or twenty begins to bring children, and for the twenty years that the chance for a life of labor was supposed to continue, is not twelve months together free from pregnancy, or the nursing of an infant. In such a case, or even in any approaching to it, it will be readily admitted that the labor of the mother will not be worth more than her own maintenance, and consequently that she would bring in nothing as hire: and it is equally clear, that if all

hire is lost, the whole value of the slave is completely sunk. But it is supposed that this loss is more than compensated by the value of her children. To test the truth of that opinion will be the object of the next estimate.

The cost of maintaining a negro child from its birth to ten years of age, in food, clothing, nursing, medical attendance, &c. cannot be less than \$14 a year—and that age is as early as the labor of the child can begin to pay for its support. The sum of \$14 paid annually for ten years, is worth at the end of that time, \$184 52—and that amount must be exceeded by the value of the child, to give any profit for its rearing. Few children of that age will sell for so much—and taking a general average of sex and value, \$170 may be assumed as a full price, which would make a loss of \$14 52 on the investment; even if the child lived so long. But there is an equal chance that the child may die before ten years old, which of course would cause a total loss of the previous expenditure. The insurance against so probable a casualty, is a fair deduction from the value that may accrue—and that insurance would probably take off one-fourth of the value of the slave—and make altogether an average loss of \$56 on each child born.

The assumption that it is an equal chance that a child will die before the age of ten years, rests on a comparison of the tables of the probabilities of life, prepared by Dr. Halley from the bills of mortality of Breslaw, and those of London and Northumberland, by Dr. Price. According to these Tables

At Breslaw, from 1000 births, 661 lived 10 years.

London, 28452 " 11582 " "

Northampton, 11550 " 5675 " "

The average of which shows less than one-half surviving to the age of ten years.

Thus, unless the foregoing estimates are very inaccurate, it is manifest that there is certain loss, instead of profit, to be met with in rearing slaves, or in owning females of any kind, whose value depends only on their physical qualities. It was not my purpose to extend the inquiry to the cost and profit of owning male slaves fit for labor. But even as to these, a comparison of selling prices with the net amount of hires, for the probable duration of a life of a labor, will show that the profits of ownership are commonly and greatly over-rated.

The foregoing estimates and deductions were written in the early part of 1832, and I have chosen to present them without alteration, although the prices of slaves have greatly varied, and more than once, since that time. Such temporary alterations of market prices, in no manner affect the truth of my plan of estimating value—except that such fluctuations are, in the general, injurious to the interest of those who hold the property; and can be beneficial only to those who speculate on the chances of the rise and fall of prices. The prices stated above both for hire and sales of slaves are believed to be as high as a fair average would indicate—and as high as can be expected of any future average, whether of ten, twenty, or fifty years. These explanatory remarks are perhaps superfluous—but they are offered to prevent having hereafter to meet the ready objection, that

my statement of prices was incorrect. If the general fairness and correctness of the estimate should be objected to, or the deductions from these premises (if their correctness is admitted,) be denied, I shall be ready and willing to maintain my positions, and pursue the investigation of the subject—still however considered as one merely of domestic and national economy.

A SLAVE HOLDER.

EXTRACTS FROM PRIVATE CORRESPONDENCE.

SEASONS AND CROPS—THE FENCE LAW—EFFECTS OF MARL—MAGADABA BEAN AND PARTRIDGE PEA—QUERIES ON HOGS AND PIGGERIES.

Charles City, July 3d, 1834.

If I was a good pensman I should like to tell you something about the Coggins Point marl, and what it is doing. I have seventy-four or five thousand corn hills marled. In my field at this time the corn is from hip to waist high. The marl was spread this spring after the land was fallowed. The corn along side of that marled is from ankle to half leg and knee high. I have thirty thousand corn hills that have been limed. The corn on that is about knee high. This is the second crop of corn I have had on it since I have rented the land. So far as I have been able to judge between the two, I prefer the marl.

Camden, S. C. July 16.

We are full of rail roads. The Charleston people want Camden to join Columbia in a road to the junction of the North and South Edisto. The Sumter folks want Camden to join in a road to the Santee, and thence to Charleston. For the benefit of the marl the former must be eventually laid down; but the importance of having a great road from North Carolina on the right bank of the Pee Dee should give that a preference. However, *non vovons*.

Buckingham C. H. July 25, 1834.

The wheat is uncommonly fine in *quality*, though short in *quantity*. Crops of corn *never* more promising, at this season of the year. We have had abundant rains, without having any storms to do injury in this neighborhood.

Neosbern, N. C. July 22.

I left Florida the middle of June. At that time crops were promising but suffering from drought. I infer from subsequent information that the drought did not continue long enough to do much injury. Late reports from Alabama speak favorably of the growing crop, and it is now probable that the crop of cotton will be large. I shall look with some anxiety for the effect of this on *prices*. At this place the rains, for ten days past, have been excessive, and the injury in the immediate neighborhood is probably considerable. I do not know how far these rains have extended.

The "Magadaba Bean" of one of your early correspondents, I suppose to be the *Aeschynomene hispidula* of botanists, which however naturally prefers a sandy, but moist soil. It is sometimes denominated "False sensitive plant." The partridge pea is the *Cassia chamaecrista* of botanists, and is

not a *vine*, as one of your late correspondents seems to suppose.* The *amphicarpa monrica*, a sort of wild pea, is a vine running over small shrubs.

Is the common mode of rearing hogs in the Southern States an economical one? I mean that of suffering them to range at large, and calling them up once a day to receive a small allowance of corn?

Could you not procure from some experienced person *at the North* the best mode of constructing and managing a *piggery*? There is a valuable account of one in New England in one of the volumes of the American Farmer. Some one has lately mentioned to me an account of a remarkable one contained in Mr. Poinsett's Notes on Mexico.

Camden, S. C. July 26.

The crop of corn and cotton in the Southern and Western States will be overwhelming. We have had plenty of rain and no freshets.

Caroline, July 28.

The prejudices which most of our old farmers entertained against marl are rapidly vanishing, and ere long, I hope to see our beautiful district of country, still more beautiful from its effects. My nearest neighbor Mr. J. H. B——, marled very heavily an acre of land last fall, and seeded it in wheat and clover. The wheat was improved by its application, and the clover is now so much better than that adjacent, that the eye detects it at a considerable distance.

I marled two acres in the spring, and seeded them in oats and grass seeds. I put about two hundred and fifty tumbril cart loads on this lot. The marl used was principally taken from the surface of one of my marl banks. There was no shell in it, but the impressions of many—and every lump was interspersed with selenite—pure gypsum. The lot produced me one hundred and seventy-five bushels of clean oats, heaping measure. This seems to me to be a good product. The rains in the spring had beaten down these oats frequently—and when cut, grass blades were used, in consequence of their tangled condition. But for these drawbacks it is probable the product would have been two hundred bushels. As your writings on the subject had first directed our attention to the effects of marl, I thought that you would not deem me impertinent to communicate the above facts to you.

[* Our two correspondents certainly mean different plants under the same name. The partridge pea so well known in Lower Virginia is the same described (in the former communication from Cambridge, Md.) as a vine which climbs upon, bears down, and thereby destroys growing wheat. It is a slender vine, bearing purple blossoms, and round dark gray seeds (about the diameter of grains of wheat,) in a cylindrical black pod, which bursts and scatters its seeds soon after ripening. Like all other plants of the pea and clover tribe the growing of the partridge pea is promoted in a peculiar degree by the use of marl and other calcareous manures—and it may be presumed also by the use of gypsum, where that manure will act on any thing.]

Gloucester, Aug. 1st, 1834.

I am pleased to find that the farmers of Virginia, are becoming sensible of the exceeding grievance which the existing law of enclosures imposes on them. It would be a relief to the farmers of this state nearly equivalent in value to their annual tax, if all were compelled to enclose their own hogs. The burthen would be vastly relieved if we could with any security make our outer fences of post and rail, or any material sufficient to defend us from our neighbor's large stock. As it is, I know no respectable farmer who would not be glad to pasture his poor neighbor's few cows, if he could thereby be secured from general depredation. All timber is becoming very scarce and expensive in the lower part of Gloucester county, and this is a matter to which we must be soon compelled to call the attention of our legislators.

IRON WAGON WHEELS.

We saw a wagon in Court street this forenoon, which, from the novel construction of the wheels, excited considerable curiosity in the passers-by. They were made entirely of iron—the outer part of the wheel was formed from a single piece of iron about an inch and a half square—the spokes were round, and five-eighths of an inch in diameter. The paves were constructed in a new and ingenious manner, by which the friction is much diminished; and the whole appearance of the wheels conveyed the idea of usefulness, neatness, and simplicity.

On inquiry, we learned that these wheels were calculated to sustain a weight of a ton and a half—and that wheels of the ordinary construction, to sustain so great a weight, would weigh about the same as these newly invented wheels. The expense also, we were informed, will not vary materially from those in common use. They were manufactured by Mr. Hale, of South Boston; and we believe this is the first attempt of the kind to manufacture all the parts of the wheel of iron. The advantages to be derived from this invention are neatness, safety, and durability.—*Bost. paper.*

TO CORRESPONDENTS AND SUBSCRIBERS.

We often receive communications of such ambiguous form as not to be sure whether they are designed for publication as they appear, or are private—or even in part confidential. To decide in such cases is incurring more responsibility than is our fair share. We have always endeavored to comply with what we presumed were the correspondent's wishes—but it is not likely that these guesses have been always correctly made. It is desirable that every article intended for publication without alteration, or with no more change of form than the editor may require, should be headed "For the Farmers' Register," or that object expressed in any other manner the writer may prefer. If any passage is intended as private and confidential, let it be marked "private," and the writer's wishes cannot be mistaken, and will be always respected. Every other letter having neither of these characters marked, will be considered as private, but from which we may be permitted as heretofore, to extract for publication any passages that we deem of interest to the public. It is in this manner that our "Extracts of

private correspondence," have been obtained—and for their insertion, we only are responsible.

The ambiguity of which we complain causes another doubt as to communications of a mixed character—that is, whether we are authorised to use the writer's proper signature, as he has given it—or should omit it, because the publication may not have been intended. If the former course is taken, and the writer's intention is mistaken; we are liable to be censured for using names without permission—and if the name is omitted, from a mistaken fear of that charge, it may be considered as a want of proper respect for the writer. Our correspondents will see the existing difficulty, and we hope, will relieve us from it in future.

We are always glad to be allowed to publish the proper signature of every one who writes on practical agriculture, or who offers any statements of facts. Nevertheless, no name will ever be so used, intentionally, without the writer's consent: and therefore our correspondents need not fear giving their names to the editor, (which is always desirable, though not insisted on) even when they wish them withheld from the public. The affixing any fictitious signature to a communication, will always be considered as a prohibition of the use of the writer's name.

These requisitions may be thought idle, and the inconveniences complained of as of no account. But the evil to us is not only considerable, but is increasing. Some of our correspondents may already have seen proofs (if indeed we have mistaken their intentions,) of the necessity of some regulation in this matter.

The proposed *Cheap Edition of the Farmers' Register* has received so little support, that the publication is necessarily abandoned. If this result has been a disappointment to our expectation of sending the Farmers' Register to a new and numerous class of readers, it has also decisively proved the general preference for the present form of our publication, and that few would feel compensated by a diminution of price, for the inferior quality and more perishable form of the Cheap Edition as proposed.

The following communications have been received: "On the true principles of profitable husbandry"—"Thoughts on rearing fruit trees"—Remarks on the Woodson and Cunningham Grapes"—Insects and their destroyers"—"On the fence law"—"Colic in horses"—"On water furrowing hill-sides"—"On Lobelia Inflata"—"Account of Emmons' horse power machinery"—"Ashes on farm yard litter"—"Petition for a change in the law respecting inclosures"—"Black peas following wheat"—"Proceedings of an agricultural meeting in King William"—"The prevailing habits and opinions which oppose the prosperity of agriculture."

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SUPPLEMENT

TO No. 4, OF FARMERS' REGISTER.

After the last sheet of No. 4 was ready for the press, we received some of the latest Nos. of our British agricultural periodicals; and being unwilling to withhold their contents entirely from our readers until October, these supplementary pages are added with that view, and also to lessen the accumulation of matter on hand for publication.

[As the want of space will not permit at this time the insertion of all the reports which form the article commenced below, it is proper to state that the results concur in proving that it is unprofitable to fatten cattle on steamed food, instead of similar food in a raw state—and that the steamed food is profitable to be used for hogs, though less so than has been supposed.]

The experiments deserve attention not only for the subject, and the results, but also on account of the very particular and accurate manner in which all the processes were conducted, and the full and clear reports exhibited. This is the proper manner in which experiments should be made, and their progress and results noted and reported: and a few such on any one contested point in agriculture, conducted by different persons, and in different modes, will go farther to reach valuable truths, than volumes of mere speculation and opinion, or of arguments founded on such unstable foundations. Nor does the difference of results in different experiments impair their value, provided every circumstance affecting them was observed and reported. In no complicated experiment, of considerable duration, can the farmer foresee or regulate every circumstance necessary to his object: and the omission of observing some one such unsought for and unexpected agent, may make the report false, and the whole experiment worse than worthless. But when all such circumstances are fully and truly stated, they often lead to truths, which though different from, may be as valuable as those that the experimenter was seeking.

The usefulness of the Highland Society of Scotland to agriculture, and to the general prosperity of their country, may be inferred from this small sample of the manner in which their patriotic efforts are directed—and we respectfully recommend the example to the different agricultural societies already formed, or now forming in Virginia. The same general faults, (though in different degrees, have been exhibited by all that have existed, and will be, we fear, by all now coming into existence. They are societies for *talking* instead of *working*—for speech-making upon things in general, instead of for making accurate experiments, and reporting statements of facts, for the improvement of agricultural practice. If the duties required of the members of agricultural societies were merely to make and report experiments in a proper manner, (though certainly there is no reason why their labors should be confined within these limits,) the value of their trans-

actions would be great indeed. By every report, or memorandum, something would be added to the amount of established truths: and by a proper bond of union between all, each society would be benefited not only by the labors of its own members, but as much by those of all others. Let each member be required to *do* something, and the labors of all would be immense, both in quantity and value. But if one hundred societies were now formed, to go through the old round of constitution-making and speech-making, they would do no good, even if they did not produce injury to their cause, as is generally the result of all misdirected efforts. There is nothing we are more anxious to see than the intellect and strength of the agricultural interest of Virginia arrayed in properly constituted agricultural societies: and there is no public measure that we have less faith in, as a means of promoting agricultural improvement, than societies organized and conducted as they generally have been.]

REPORTS ON THE COMPARATIVE ADVANTAGES OF FEEDING LIVESTOCK ON RAW OR ON PREPARED FOOD.

From the Prize Essays and Transactions of the Highland Society of Scotland.

[In 1833, the Society, considering the importance of determining the comparative advantages of feeding live-stock on raw or on prepared food, offered a piece of plate of Thirty Sovereigns value, for the best report, founded on actual experiment, made for that purpose, on a number of oxen or heifers, not fewer than six, the animals to be of the same breed, age and sex, and the term of feeding not less than three months. At the same time, a premium of Ten Sovereigns was offered for a report on the feeding of ten or more swine of the same age and breed. Five reports were received. The premium for horned cattle was adjudged to Mr. Walker, Ferrygate, Haddington, and that for swine to Mr. Boswell of Balmuto. Extracts of the other reports, to the authors of which the thanks of the Society were voted, are also given.]

Report of an Experiment on the Feeding of Six Heifers and Four Oxen.

By Mr. ROBERT WALKER, Ferrygate, Haddington.

Here, ample barn-yards still are stored
With relics of last autumn's hoard,
And firstlings of this year.

On the 20th day of February 1833, we put up to feed six two-years-old heifers, bred by ourselves, got by a thorough bred short-horned bull, out of common country cows, and as nearly equal as could be selected from a large lot, both in point of weight and feeding qualities. At the same time, we also put up four two-year-old stots, part of a lot purchased at Dalkeith October Fair from Mr. James Haliburton, cattle-dealer, at Hawick.

From the circumstance of both lots having been, some time previous to 20th February, on full keep,—the heifers on common white glope turnips, with an allowance of 3 lbs. of bruised

beans each beast per day, the stots on good purple-topped Swedish turnips, and the same quantity of bruised beans per day,—we were enabled to make a better selection than we could have done from any lot of lean cattle, because they had then fully begun to display their feeding qualities. Both lots previous to 20th February were kept amongst others in the open court-yard with sufficient shedding.

On being put up preparatory to this experiment, the heifers were divided into two lots of three each, as nearly equal as possible, both in point of weight and apparent feeding qualities, and put into an open court-yard with sheds, which had been divided with a railing for the purpose of keeping them separate, and lots were cast to determine which three were to be put on raw, and which three on the steamed food.

The same preparatory process was followed with the stots, equally divided, two and two in each lot,—only with this difference, that the stots were kept entirely under cover of the sheds, but loose, and having abundance of room to walk about, with plenty of light and air.

The heifers were allowed as many purple-topped Swedish turnips topped, rooted, properly cleaned, and cut into pieces, so that they could get them into their mouths, as they could consume, with 3 lbs. of bruised beans, and 20 lbs. of potatoes each beast per day, in addition to the turnips, with half a stone of straw each.

The stots were allowed as many of the same sort of turnips as they could eat, with 4½ lbs. bruised beans, and 30 lbs. of potatoes each beast per day, with half a stone of straw each. That is to say, the food of the stots and heifers was the same only with this difference, that the stots were allowed 1½ lbs. beans and 10 lbs. potatoes more per beast than the heifers, each day.

The mode of preparing the food was steaming, by placing a tub, with holes in the bottom, above a common furnace pot or copper, used for making the harvest porridge. The tub was drawn off and on the top of the pot by a block and tackle, attached to a sort of crane for shifting the tub into the position when wanted. The tub used for preparing the food of the three heifers, was in diameter at top 3 feet 1½ inches, at bottom 2 feet 10½ inches, in depth 1 foot 8 inches. The tub was filled as full as it would hold in the first place with turnips, which required from five to seven hours to steam;—the potatoes were put in on the top of the turnips, about an hour or three-quarters of an hour before being taken off, when the turnips had fallen so much down or lost bulk sufficient to admit them,—the beans were put in last, from twenty to thirty minutes before being taken off,—and all three when taken off were thrown into other tubs with a shovel, and well mixed.

The food for the stots was prepared exactly in the same manner but in a separated tub, at an adjoining farm. The size of this tub was less than the other, being in diameter at top 2 feet 7½ inches, at bottom 2 feet 4 inches, and in depth 1 foot 7½ inches. The food in both cases was given to the cattle in wooden stalls or troughs, always properly cleaned once each day.

Both lots, the cattle on steamed as well as raw food, were fed three times per day,—at day-break, at noon, and lastly an hour before sunset.

The bruised beans were given to the lots on raw

food at noon, the potatoes one-half in the morning and the other half at noon.

In both cases, the greatest attention was paid to give both those on raw and those on steamed food as much as they could eat, but no more, so that their food might be as nearly as possible eaten up at the times of refeeding, this being, in the opinion of the reporter, always a prime consideration in every case of feeding, so that the stalls may be always kept clean, and regularly cleared of the refuse.

A table is annexed of the live-weight of the cattle at the beginning of the experiment, the weight at the expiry of every month, and the progressive monthly improvement, with the total improvement in weight during three months; and lastly, their live-weight, when sent away to be slaughtered,—with a comparative statement of their live and dead weights.

The apparatus for weighing the cattle is simply a common steelyard, such as is used at the toll-bars in the county of Edinburgh for weighing carts. The cattle stand on a flat board, which is covered with a little chaff or straw, to prevent the treading of their feet making a noise to frighten them—the board being laid upon blocks of wood, which are put into the frames where the cart-wheels stand, in weighing carts, and elevated just sufficiently high to make the board swim clear of the frame-work of the steelyard. The cattle walk on to the board, which is surrounded on three sides with hurdles or gates, to keep them steady on it during the time they are weighing, the servants standing behind at the open end where the cattle enter. With this very simple apparatus, one might engage to weigh ten cattle in as many minutes—the cattle in general going as easily off and on the steelyard as moving a little backwards and forwards on plain ground.

We very soon discovered that the cattle on the steamed food consumed considerably more turnips than those on the raw food, having laid down for the three heifers on raw food two cart-loads, containing together 25 cwt. 1 qr. 14 lbs. of turnips, and at the same time the like quantity for the three heifers on steamed food; but at the end of four days, very few turnips were left to put into the steam-tub, while apparently little more than the half of those laid down for the raw food was consumed. We then added another load of 12 cwt. 2 qrs. of turnips to the steam, and at the end of seven days, the three heifers on the raw-food had consumed the quantity laid down for them, while the three on steamed-food had consumed the same quantity, and very nearly the whole of the additional quantity of 12½ cwt., at least all but about a half tub, or 250 lbs. of raw turnips; and in order to be very correct, we proceeded to weigh the steamed turnips which were left unconsumed, when we found they only weighed 195 lbs. This circumstance of the weight being much less than we expected, put us on making a series of experiments, of the difference of the weight when put in raw and after being steamed, the result of which will be afterwards detailed, and also in ascertaining, by a more lengthened experiment, the relative quantities of food consumed by each lot of cattle.

On this first and short experiment during one week of seven days, the three heifers on raw food had consumed, as before stated, 25 cwt. 1 qr. 14

lbs. of Swedish turnips, 3 cwt. 3 qrs. of potatoes, and 63 lbs. of bruised beans, being at the rate of 135 lbs. of turnips, 20 lbs. of potatoes, and 3 lbs. of bruised beans for each beast per day. While the three heifers on steamed food had consumed in the same space of seven days, about 37 cwt. 16 lbs. of turnips, being at the rate of 190 lbs. of turnips, 20 lbs. of potatoes, and 3 lbs. of bruised beans per day for each beast, a difference of 55 lbs. of turnips consumed by each beast on steamed food per day more than what was consumed by those on raw food.

On a pretty lengthened experiment made on the difference of the weight of turnips before and after being steamed, we found the result to be as follows:—Upon turnips which had been taken from the ground in the early part of February, when they were full of juice, weight when raw 5 tons 8 cwt., after being steamed 4 tons 4 cwt. 3 qrs. 16 lbs., being a loss of weight in the process of steaming of 1 ton 3 cwt. 12 lbs., or in round numbers, the turnips may be said to have lost nearly one-fifth of their weight in the process of steaming, and further we may mention, that they also lost about one-fourth or one-fifth of their bulk. But at an after period, when the turnips were lifted from the ground after the middle of April, the loss of weight in the steaming process was not near so great, not being one-sixth of their raw weight in place of one-fifth as formerly stated. The loss of weight on steaming potatoes was a mere nothing, not being more than $\frac{1}{4}$ th part: Still, although the cattle at this latter period, viz. the end of April and beginning of May, did not consume quite so much weight of turnips, they consumed fully more bulk. The turnips having lost considerably in weight in proportion to their former bulk, it now requiring a larger cart-load to weigh 16 cwt. than it did in the month of February; this circumstance being easily accounted for, because the tops of the turnips were now vegetating rapidly, and the bulb losing its former sap. But in every case throughout the whole course of the experiment, the difference consumed by the cattle on steamed food above those on raw, was about 55 lbs. of turnips per day for each beast.

As formerly stated, the stots were allowed, in addition to the turnips, 30 lbs. of potatoes each, and 4½ lbs. of bruised beans, being 10 lbs. of potatoes and 1½ lbs. of beans each beast more than the heifers per day. In this case, the result was exactly similar to that of the heifers, the stots on the steamed food consuming about 55 lbs. per day of turnips more than those on the raw food each beast.

The steamed food being 94 cwt. 14 lbs. of turnips for twenty-eight days of two cattle, about 195 lbs. per day, and the raw food being 70 cwt. for the same time, about 140 lbs. per day. The twenty-eight days alluded to were the last twenty-eight

days of the experiment, from the 22d of April till the 20th May.

We may now be permitted to state, that our experiment might very easily have shown different results; that the cattle on steamed food might have been shown to have consumed less instead of more food, and as a necessary consequence, a great shortcoming in the article of improvement, because in the very outset of our experiment, we discovered that it was necessary that the steamed food should be always fresh, or in other words, newly done, and if it was old done, cold and sour, the cattle would hardly eat it unless when very hungry; in short, the quantity they would consume might have been made to agree to the fresh or sour state of the food when presented to them. If warm and newly done, they would eat up their feed with avidity, if cold and sour, they would not taste it, unless compelled by hunger. We therefore resolved to give them their food always as newly prepared as possible, thinking that the first object of our experiment was to fatten both lots of cattle as well as we could, and afterwards to calculate the expense. We are quite aware, that to have done a large quantity at one steaming, would have lessened the expense both of coal and labor, and also, by getting sour before being used, saved a vast quantity of food. But we are equally well aware, that by so doing, we never could have fattened our cattle on steamed food. And on the other hand, had we restricted our different lots of cattle to the same weight of food, those on steamed food would not have had as much as they could consume, provided the steamed food was properly administered; and therefore, by a parity of reasoning, the cattle on the steamed food could not make the same improvement as they would have done on full keep. Our object has therefore been, as formerly stated, to fatten both lots of cattle, and afterwards calculate the different expense.

A small quantity of salt was allowed the cattle as a sort of condiment amongst their food. Those on steamed food had it amongst their food when being taken from off the steam; those on raw food had it mixed with the bean-meal, at the rate of about $\frac{1}{4}$ th of a lb. each beast per day. They did not get any salt for the first ten days, but after being used to it for three weeks, we tried the cattle on steamed food with one feed without salt. They did not seem to relish it so well: we then put a little salt on their food in the stall, and they at once began to eat greedily; both those on steamed and those on raw food were evidently fond of the salt. We used the salt at the first, in order to prevent the steamed food from getting so soon sour, which had a very decided effect in this respect. In our calculations of the value of keep, we have not stated any thing for straw consumed by the cattle, as they were frequently supplied with litter of the same sort of straw, not deeming the straw of any other use than being made into dung.

TABLE I.

Live weight of Cattle, with monthly increase, and total increase of weight in three months; and also Live weight when sent away to be killed, with Dead weight of Beef, Tallow, Hides, &c.

	1	2	3	4	5	6	7	8	9	10	11	12	13
	Live weight 20th Feb.	Live weight 20th March.	Increase 1st month.	Live weight 20th April.	Increase 2nd month.	Live weight 20th May.	Increase 3d month.	Total increase for 3 months.	Live wt. when sent away to be killed.	Dead weight Beef.	Weight of Tallow.	Weight of Hides.	Weight of Offals.
HEIFERS.													
Steam food,	st.	st.	st.	st.	st.	st.	st.	st.	st.	st. lb.	st. lb.	st. lb.	st. lb.
No. 1.	76*	83	7	87	4	92	5	16	90	51 12	8 4	3 12	25 13½
No. 2.	78	84	6	90	6	95½	5½	17½	94	54 0	8 4	4 3½	27 7
No. 3.	68	74	6	79½	5½	83	3½	15	83	46 2	6 10	3 8	26 8
	222	241	19	256½	15½	270½	14	48½	267	152 0	23 4	11 9½	80 0½
Raw food,													
No. 4.	84	89	5	95	6	98	3	14	98	55 8	8 7	4 3	29 10
No. 5.	63½	76	7½	81	5	86	5	17½	86	48 4	6 12	3 7½	27 4½
No. 6.	70	76	6	81	5	84	3	14	84	46 5	9 6	5 1½	23 1½
	222½	241	18½	257	16	268	11	45	268	150 3	24 11	12 12	80 2
STOTS.													
Steam food,													
No. 7.	84	90½	6½	99	8½	103	4	19	99½	56 10	8 11	5 12	28 3
No. 8.	92	98	6	103	5	106	3	14					
	176	188½	12½	202	13½	209	7	33	99½	56 10	8 11	5 12	28 3
Raw food,													
No. 9.	90	96	6	100	4	105	5	15	102½	58 6	8 8	5 4	30 4
No. 10.	81½	92½	8	100	7½	108	8	23½					
	7½	18½	14	200	11½	213	13	38½	102½	58 6	8 8	5 4	30 4

Explanation of the above Table.—Column 1. contains the live-weight of the cattle when put up to fatten on the 20th of February. Column 2. the live-weight on the 20th of March. Column 3. the increase of the cattle for first month, viz. from the 20th February till 20th of March. Column 4. live-weight on the 20th of April. Column 5. increase the second month. Column 6. live-weight on the 20th of May. Column 7. increase the third month. Column 8. Total increase for three months. Column 9. live-weight when sent away to be killed; the heifers on the 25th of May, and the stots on the 10th June. Column 10. dead weight of beef. Column 11. weight of tallow. Column 12. weight of hides. And, column 13., offals, or weight wanting over beef, tallow, and hides, to make up the live-weight when last weighed.

TABLE II.

Cost of the Keep of Cattle for One Week.

Three heifers, on steamed food,	Cwt.	qrs.	lbs.	price	per cwt.	Amount.
consumed of Swedish turnips,	37	0	16	£0	0 4	£0 12 4½
of potatoes,	3	3	0	0	1 3	0 4 8
of beans, 1 bushel,	0	2	7			0 3 0
of salt,						0 0 0½
Estimate for coal and extra labor						0 2 0
Cost of one week of three heifers, or 7s. 4½d. each per week,						£1 2 1½
Three heifers, on raw food,	Cwt.	qrs.	lbs.	price	per cwt.	Amount.
consumed of Swedish turnips,	25	1	14	£0	0 4	£0 8 6½
of potatoes,	0	3	3	0	1 3	0 4 8
of beans, 1 bushel,	0	2	7			0 3 0
of salt,						0 0 0½
Cost of one week of three heifers, or 5s. 5d. each per week,						0 16 3
Additional cost per week on three heifers on steamed food,						£0 5 10½

* The stow 14 lbs. avoirdupois, is the weight marked in this table.

TABLE III.

	Cwt.	qrs.	lbs.	price per cwt.	Amount.
Two stots, on steam,	23	2	0	£0 0 4	£0 7 10
consumed of Swedish turnips,					
of potatoes,	3	3	0	0 1 3	0 4 8
of beans, 1 bushel,	0	2	7		0 3 0
Estimate for coal and extra labor,					0 1 6
for salt,					0 0 0½
Cost of one week for two stots, or 8s. 6½d. each per week,					£0 17 0½

	Cwt.	qrs.	lbs.	price per cwt.	Amount.
Two stots, on raw food,	17	2	0	£0 0 4	£0 5 10
consumed of Swedish turnips,					
of potatoes,	3	3	0	0 1 3	0 4 8
of beans, 1 bushel,	0	2	7		0 3 0
of salt,					0 0 0½

Cost of one week of two stots, or 6s. 9½d. each per week, £0 13 6½ 0 13 6½

Additional cost per week on two stots on steamed food, £0 3 6

Cost of 3 heifers on steam food, from the 20th of February till the 20th of May, 12 weeks 5 days, at £1 2 1½ per week, as per Table II, £14 1 3½

Cost of 3 heifers on raw food, from the 20th of February till the 20th of May, 12 weeks 5 days, at 16s. 3d. per week, as per Table II, 10 6 7½

Total additional cost of 3 heifers on steam food above those on raw food, £3 14 8½

Estimate of Profit and Loss.

Value of 3 heifers on steam food at 20th February:

Live-weight as per Col. 1. Table I. 222 stones, divided by 1.75, as a factor, gives 126 stones

12 lbs. of beef, at 5s. 6d. per stone, sinking the offal, £34 17 8½

Add cost of keep as above, 14 1 3½

Total cost, £48 19 0 £48 19 0

Value when killed, 152 stones of beef, as per Table I. Col. 10 at 6s.

6d. per stone, sinking the offal, 49 8 0

Profit on the cattle on steam food, £0 9 0

Value of 3 heifers on raw food at 20th of February:

Live-weight as per Col. 1. Table I. 222½ stones weight, divided by 1.75, as a factor, gives 127

stones 2 lbs. at 5s. 6d. per stone, sinking the offal, £34 19 3½

Add cost of keep as above, 10 6 0½

Total cost, £45 5 10½ £45 5 10½

Value when killed 150 stones 3 lbs. of beef, at 6s. 6d. per stone, as per Col.

10. Table I. sinking the offal, 48 16 4½

Profit on the cattle on raw food, £3 10 6

Cost of two stots on steamed food from the 20th of February till the 20th of May, 12 weeks 5 days, at 17s. 0½d. per week, as per Table III, £10 16 8

Cost of two stots on raw food from the 20th of February till the 20th of May, 12 weeks 5 days, at 13s. 6½d. per week, as per Table III, 8 12 2

Total additional cost of two stots on steamed food above those on raw food, £2 4 6

Estimate of Profit and Loss.

Value of stot No. 7. Table I. at 20th of February:

Live-weight 84 stones, divided by 1.75, as a factor, gives 48 stones of beef at 5s. 6d. per stone,

sinking the offal, £13 4 0

Cost of keep as above, 5 8 4

Total cost, £18 12 4 £18 12 4

Value when killed 56 stones 10 lbs. of beef, as per Col. I. Table I.

at 6s. 6d. per stone, sinking the offal, 18 8 7½

Loss on steam stot, £0 3 8½

Estimate of Profit and Loss.

Value of stot No. 9. Col. 1. Table I. 20th February:

Live-weight 90 stones, divided by 1.7b, as a factor, gives 51 stones 6 lbs. of beef, at 5s. 6d.	£14 2 10½
per stone, sinking the offal,	4 6 1
Cost of keep as in Table III,	

Total cost, £18 8 11½ £18 8 11½

Value when killed 58 stones 6 lbs. of beef, as per Table I. Col. 10.
at 6s. 6d. per stone, sinking the offal,

18 19 9½

Profit on stot No. 9. on raw food, £0 10 10

In the foregoing estimate of value, we have stated the beef in the lean state, at 5s. 6d. per stone at the beginning of the experiment, and 6s. 6d. per stone when killed, which, we trust, will be thought a moderate rate of improvement in the value of the beef when fattened.

From the intimation contained in the foregoing Tables, &c., every person will be able to judge for himself of the comparative cost of keep and improvement.

It will be seen from Table II, that the three heifers on steamed food cost on the article of keep £1 2 1½ per week, while the three on raw food, cost only 16s. 3d., a difference of only 5s. 10½d. per week less expense being on the raw food, being 5½d. more than equal to the expense of keep of another beast on raw food.

And referring to Table I, Cols. 10. and 11, it will there be seen that the three on steamed food had only 1 stone 11 lbs. more beef, while the three on raw food had the advantage in point of tallow, by 1 stone 7 lbs., so nearly equal in this respect that there cannot be said to have been any difference at all; and by referring to the stots in the same manner in the same tables, the advantage will be found to be in favor of the raw food. Therefore, we have no hesitation in saying, that in every respect the advantage is in favor of feeding with raw food. But it is worthy of remark, that the difference in the consumption of food arises on the turnips alone. We would therefore recommend any person wishing to feed cattle on steamed food, to use potatoes, or any other food which would not lose bulk and weight in the steaming process, as there is no question but in doing so they would be brought much nearer to each other in the article of expense of keep. But from the experiment made by us, as will be seen by the foregoing estimate of profit and loss, the profit is greatly in favor of feeding with raw food. Upon the whole, we freely give it as our opinion, that steaming food for cattle will never be attended with beneficial result under any circumstances whatever, because it requires a more watchful and

vigilant superintendence during the whole process than can ever be delegated to the common run of servants, to bring the cattle on steamed food even upon a footing of equality, far less a superiority, to those fed on raw food.

The only thing which it remains for us to state is, the periods when the cattle were killed, and how they were fed from the 20th May until sent off. The heifers were turned out to a very fine field of grass, of the first season, on the 22d May, where they remained three days, and were then sent away to be slaughtered. They were exhibited at a local Agricultural Show on the 25th May on their road, when the judges thought them fit cattle for the experiment; but none of the gentlemen present were able to distinguish which lot had been fed on steamed food, or which on raw: they were killed on the 28th of May.

Only two of the stots were killed, that was No. 7. of the steamed food, and No. 9. of the raw food; the other two, No. 8. and No. 10. were kept on. A statement of their after management and improvement will now be given. The whole four stots were turned out to the foresaid young grass-field on the 25th May, after the heifers went away, the two which were killed on the 12th, and weighed, as per col. 9, Table I, on the morning before being sent away. The other two which were kept on, were not weighed until the 20th of the month, being the usual day from last weighing.

They remained in the grass-field, which was good land and very fine pasture, until the 12th of August, when they were brought into the courtyard, and were fed on second crop cut clover-grass, what they could eat, with the old allowance of 4½ lbs. of bruised beans per day each.

On the 4th October current, they began to get, in addition to the cut grass and beans, a few common white globe turnips.

The following Table will exhibit their live-weight, with the improvement or loss of weight at the end of every month.

Table of Live-Weight of two Stots kept on.

		No. 10. on raw food.	No. 8. on steamed food.	In- crease.	Loss.
	Live-weight, when weighed on 20th May, as per Table I. Col. 6.				
May 20.	No. 8. or former, on steamed food, - - -		106		
"	No. 10. " on raw food, - - -	108			
June 20.	No. 8. " on steamed food, - - -		105		1
"	No. 10. " on raw food - - -	109		1	
July 20.	No. 8. " on steamed food, - - -		103		2
"	No. 10. " on raw food, - - -	106			3
Aug. 20.	No. 8. after being 8 days in the court-yard on cut grass, - - -		108	5	
"	No. 10. do. do. do. do. - - -	108		2	
Sept. 20.	No. 8. do. do. do. do. do. - - -		113	5	
"	No. 10. do. do. do. do. do. - - -	111		3	
Oct. 18.	No. 8. after getting a few turnips since 4th curt. - - -		118	5	
"	No. 10. do. do. do. do. do. - - -	120		9	

It would therefore appear that the cattle fell off during the time they were out at grass, although, as formerly stated, the pasture was exceedingly fine. We have often before thought that cattle which had been highly kept during winter, made no improvement on grass, but never before had an opportunity of trying their live-weight. From this trial it would further appear, that the stot which was formerly fed on steamed food, has done quite as well since being again put on raw food, as the one which was formerly fed on raw food, as they at this day bear the same relative proportion in their live-weight, which they did on the 20th of May, namely, the raw is still 2 stones in advance, having both increased 12 stones since the 20th of May.

We have not yet determined how long we will keep the two stots, but intend noticing their respective improvement so long as they are kept.

EXPERIMENT ON THE COMPARATIVE ADVANTAGES OF FEEDING HOGS ON RAW OR ON PREPARED FOOD.

By MR. W. DUDGEON, Sypelaw, near Kelso.

From the Prize Essays and Transactions of the Highland Society of Scotland—published in the last No. of the (British) Journal of Agriculture—for June, 1834.

The reporter having, for the last three years, paid a good deal of attention to the rearing and feeding of swine, has some satisfaction in reporting the result of his experiments. It being rather difficult to select the animals all of the exact age and the same sex, the reporter considered it of greater consequence to have the ten shots of the same kind, considering the sex to be less material. He was fortunate in getting nine of them of one litter when nine weeks old, and had other three of the same description from another sow. He accordingly proceeded to put up two lots in separate crews, or sow-houses, say six *he* pigs in one place, and five *she* ones in the other; having had them all successfully cut, and with every appearance of

doing well. At the same time, the reporter placed other three pigs in a different allotment.

In the mean time, the reporter, on the 2d of July, began to feed the two first lots, giving boiled potatoes to the one description, being lot No. 1. (males,) and to the other, No. 2. (females,) raw potatoes; both lots continued to eat this food with great avidity, getting, at the same time, a little cut grass. About a fortnight afterwards, the reporter changed the food to beans—raw and boiled, of course, to the separate lots. Lot No. 1. got boiled beans, which they ate pretty well; and the other lot got raw beans ground, mixed with water, and salt being applied with both the raw and boiled beans; but the lot No. 2. were very shy in eating their food for some time, and seemed to prefer the cut grass: they, in consequence, did not keep pace with lot No. 1., as they took to the boiled food more readily. However, in the course of eight days, lot No. 2. seemed to take more with the hashed beans, and devoured them greedily, which caused a sort of eruption to come out upon their ears, showing that the food was rather heating for them. The reporter, in consequence, caused a proportion of potatoes to be given with the beans, and added a little more salt, always, of course, observing to give No. 1. the boiled food, and No. 2. the raw. That this mixture had the effect of allaying the irritability and itchiness on their ears and skin, was very soon observable by their taking on fat, and appearing altogether more healthy. The reporter was particularly well situated for ventilating the sow-houses, where they got plenty of room to move about, and had a separate place for feeding and exercise, as well as a place for them to repose in, after receiving their several quantums. These circumstances he considers of consequence in the feeding of these animals, for when kept dry, clean, and airy, they thrive and feed well on comparatively little food, as will be shown by their respective weights, taken at different times, in the annexed table.

Respecting the three pigs, which shall be de-

signated lot No. 3, the reporter was anxious to ascertain the respective merits of the sexes in feeding, and he put up two males and one female in this crew, which he caused to be fed on raw and boiled food indiscriminately, as it happened to be left over, after serving the other two lots of shots. Two of the pigs of this last mentioned lot were of a very peculiar breed, being a cross of the wild boar and the common sow; they were marked exactly like a zebra, but did not take on fat so readily as the other pigs; hence they were not so profitable, but their bacon had a peculiarly rich and delicate flavor. The reporter had all the three lots of pigs repeatedly washed with soap and water, and he thinks it refreshed them greatly, and caused them to relish their food.

The reporter every eight or ten days, say from the 2d of July till the 2d of October, made repeated observations on the appearance of all the animals; and he may now state generally, that lot No. 1. (males,) fed exclusively upon boiled meat, did thrive throughout in a superior manner to the others, and even to those who had an occasional mixture of raw and boiled meat: thus showing that boiled meat is at all times more nutritive than the raw. The reporter thinks that in all cases of feeding swine, they should be fed on prepared food, adding always a sufficient portion of salt, which seems a necessary condiment in most descriptions of prepared food.

Original expense of the purchasing and feeding the Swine.

To paid for 10 pigs at 25s. each,	£12 10 0
To amount of expense for feeding Lot, No. I.	£8 2 0
ditto, of ditto, No. II.	6 9 0
	14 11 0
Amount,	£27 1 0

Items of expense of food for Lot, No. I.

To 4 bolls of beans at 21s.	£4 4 0
expense of hashing ditto,	0 8 0
fuel and salt,	0 10 0
30 bushels of old potatoes, at 8d. per bushel,	1 0 0
40 ditto of new ditto at 1s. ditto,	2 0 0
	£8 2 0

Ditto of food for Lot, No. II.

To 4 bolls of beans at 21s.	£4 4 0
30 bushels of old potatoes at 8d.	1 0 0
25 ditto of new ditto at 1s.	1 5 0
	6 9 0

Amount of expense for food, £14 11 0

Price at which the pigs sold for.

To Lot, No. I. at 45s. each,	£11 5 0
Lot, No. II. at 29s. each,	7 5 0
	£18 10 0

Abstract.

To amount of the price and expenses of feeding the swine as per preceding page,	£27 1 0
Amount received, being the price of the pigs sold,	18 10 0
Loss in feeding the swine,	£8 11 0

Table of weights of the Swine.

I. He Pigs.

	Weights. st. lbs. oz.	Increase of Weights. st. lbs. oz.
July 2. Weight taken as of this date,	17 2 0	
Aug. 19. Ditto taken as of this date,	27 2 8	10 0 8
Oct. 12. Ditto taken as of this date,	55 8 4	23 5 12
Total increase of he pigs since 2d July to 12th October,		38 6 4

II. She Pigs.

July 2. Weight taken as of this date,	14 1 0	
Aug. 19. Ditto taken as of this date,	17 5 8	3 4 8
Oct. 12. Ditto taken as of this date,	31 12 8	14 7 0
Total increase on she pigs from 2d July till 12th October,		17 11 8

Abstract.

Increase on he pigs from 2d July, until the 12th October,	38 6 4
Ditto on she pigs from 2d July till 12th October,	17 11 8
Total increase,	56 3 12

By these tables and statements, the reporter shows a loss of £8 11s. on feeding of the said swine, but which could not have taken place had the pigs been bought at a reasonable price at the time, the reporter having paid 8s. or 10s. more than they were really worth, on account of the recommendation of the breed, and being anxious to furnish the Society with a report; the result of which satisfies him, that the prepared food is the best to be given this description of animals; and, besides, the meat is considered to be superior to those fed on raw food. It will be observed, that lot No. 2 did not at all keep pace, or bear a proper comparison, with lot No. 1; although they did not consume the same quantity of food (and hence were not so extravagant in feeding,) still the reporter thinks they ate an additional quantity of grass, this being given to both lots. Respecting lot No. 3, which got a mixture of food both prepared and raw, they approached nearer to No. 1, in respect to their feeding properties, but they appeared occasionally shy at having their meat so mixed. The reporter was therefore convinced, that it is better, in general, to continue for some time only one description of food, as, whatever the animals become accustomed to, they begin to relish and thrive accordingly.

TO CORRESPONDENTS.

In addition to the communications before stated to have been received, we have to acknowledge the following: "Review of Dr. Spofford's Address to the Agricultural Society of Essex, Massachusetts"—"On gamma grass"—"On buckwheat and millet."

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No. 5.

EDMUND RUFFIN, EDITOR AND PROPRIETOR.

ON THE TRUE PRINCIPLES OF PROFITABLE HUSBANDRY.

To the Editor of the Farmers' Register.

It is of course, one object of the efforts of every farmer, to increase the profits of his estate, but there is great diversity, both of opinion and practice, as to the best mode of effecting this. The method most acted on in Virginia, or at least in that part of it with which I am best acquainted, the south side of James River, is to lay out any surplus of money which the farmer should happen to have, in the purchase of additional laborers; to make his land produce as much as he can force out of it every year; and when it wears out, to buy another tract if he can. And we are frequently reminded in argument, that it is to this system, that the rich old planters among us owe their estates. But it may be objected that the circumstances in which these were placed, were essentially different from ours—land was in their day fresh and productive, and the price of agricultural products generally so high, that even under their system of farming, industry met with a rich reward. It may also be observed, that although individuals have thriven under this system, the community has suffered—lands have been exhausted by it—population checked—and the accumulation of capital generally prevented. The decrease in the returns of labor, owing principally to the deterioration of the soil in this part of our state, is much greater than is generally supposed; great as it is universally admitted to be. In the days of our forefathers, 3000 pounds of tobacco to a hand, was not, it is believed, a very uncommon crop. At the present day, 1000 pounds are estimated to be fully the average. In the county of Mecklenburg, certainly of medium fertility, through the whole length of which the Roanoke rolls its fertilizing waters, it is computed by a very competent judge, that 750 pounds would equal the average. Some (though a very inadequate) compensation may be found for this, in the increase of the wheat crop. On the whole, however, we cannot conceal from ourselves that under the system heretofore practised, the profits of agriculture in Virginia, have diminished, are diminishing, and are not likely to increase. To what cause then is this result owing? Neither industry nor economy is rare among us. How happens it then, that a climate so benign, capable of rearing the products of almost every other, and having some peculiar to itself, with a soil which nature made productive, and with institutions that stimulate our efforts, by securing their fruits from the capacity of others: how happens it that with all these advantages, our march is retrograde? The answer to this inquiry, I think, may be found in the principles on which we conduct our agriculture, in the fact that we bestow our capital on the increase of labor, and not on the improvement of the soil. It is obvious that the profit of a farmer must arise from the excess of his income over his outlay or expenditure. Now his expenditure, however diversified may be its items, is all reducible to the two heads of labor and land, and it is perfectly

immaterial in this inquiry, whether the human labor he employs be that of hirelings, as at the north, or of his own slaves, as is usual with us in Virginia; for these are a portion of his capital, and the interest of this capital, if converted into money, together with the maintenance of the slaves, is the hire which he pays. Now it has been estimated in the Register, and the estimate is confirmed by the experience of all, it is believed, who have made the calculation, that the expense of cultivating land is with us at least five dollars per acre; but the average value of land in Virginia, certainly in this part of it, falls far short of eight dollars per acre. Its yearly value or rent then is less than fifty cents. We come thus to the remarkable conclusion, that in this comparatively long and well-settled country, we bestow more than ten times as much upon labor as upon land. In New York, it would seem from the estimate in Judge Buel's piece, in the second number of the second volume of the Farmers' Register, that the rent of land was about equal to half the cost of its cultivation: in Flanders the rent is half the gross product. It seems then that as agriculture improves, the cost of cultivation relatively to the value of the land declines. That is, the profits of the farmer go to increase the productiveness of the soil, so that with the same labor, he obtains larger results. Now it is human labor which gives their value to all the other means with which the farmer operates, and it is consequently the most valuable and the most costly of any. That system then which to produce a given result, uses the least of this expensive element of productiveness, is the most profitable. As the improvement of the soil is obviously the most effectual means of doing this, to grudge the sums necessary for improvement, is in the long run, extravagance and not economy. And if we leave speculation, and look at facts, the conclusion will be the same. By referring to Mr. Harder's communication (Farm. Reg. 1st Vol. 9th No.) it will be seen that with labor not costing more than \$300, he obtains crops worth more than \$2500. Compare this with what we every day witness in our own part of the country, where the expense of tillage is sometimes greater than the whole amount of the crop, and it will go far to explain the problem with which we set out. Economy of human labor indeed, seems to me to be the principle which lies at the foundation of all good husbandry, and which will explain every difference between a well and ill managed farm. Be consistent and systematic in the application of this principle, and it will compel you to have good fences, to procure the best tools, and a plentiful supply of strong and serviceable horses and oxen for draught and the plough; and the change thus produced is one which does not merely recommend itself to the proprietor—to the eye of taste and feeling, the sight of a beautiful and highly cultivated country, is one of the most delightful which can be presented. To look upon "pastures clothed with flocks and valleys covered over with corn," must excite in the patriot and philanthropist, emotions of the liveliest pleasure; while the perpetual contemplation of increasing sterility, seems calcu-

lated to harden the heart, and to contract all its feelings into the narrowest selfishness. Looking then at all its consequences, it may well be questioned, whether we are not responsible for the desolation we have produced, whether we have the moral right to strip the soil of the magnificent forests which have waved over it for centuries, and to leave it covered in their stead, with broomstraw, dock and mullein, and reddened with galls and channelled with gullies.

A. B.

[The writer of the foregoing communication, has exposed to view, though hastily and slightly, one of the main causes of unprofitable tillage in Lower Virginia. It is to be regretted that he did not extend his remarks, and exhibit more of the consequences, which (may not only be inferred from his undeniable positions, but) are matters of general experience. It is undoubtedly true that we generally employ more of human labor in tilling our farms than sound views of profit would direct—in some cases (and not very rare cases) the net hire of the slaves, or the interest on the money they could be sold for, would amount to double the net product of the crops they make. No man in his proper senses would employ labor in this wasteful manner, if he had to procure it by hire or by purchase—but his owning the slaves in no degree effects the estimate, or lessens the loss he thus incurs. The truth is, that the extent of our employment of slave labor is very seldom directed by calculations of profit or loss, or regulated by the demands of the farm. We generally hold the slaves that have been derived from inheritance or other sources, until the death of the owner requires their distribution, or his necessities compel the sale of a portion of them, to maintain the balance—and almost never by a proper consideration of how many laborers and of what kinds, the proper cultivation and judicious management of a farm require. According to chance, to the necessities, and to the feelings of the farmer, and not according to any sound or mature estimate of the stock wanted for his farm, the amount of his slave labor is regulated—and wherever the proportion is very different from what a proper estimate would direct, there can be no doubt that the farming operations so conducted must be subject to certain and heavy loss.]

ON TURNING IN GREEN CROPS FOR MANURE.
From the Transactions of the Essex (Mass.) Agricultural Society for 1834.

The Committee on Turning in Green Crops for Manure, report:

That there are many different sorts of vegetable substances, when deprived of their living property, by undergoing the process of decomposition, that soon become proper for the nutrition and support of new plants and fit for being applied as manure.—Their reduction to this state is greatly promoted by their being exposed to the full influence of the air, moisture, and a suitable degree of heat. And it may be remarked that in vegetable productions the changes are less rapid than those of the animal kind, and probably much more varied according to the various states and textures of the particular substances, and it is obvious from numerous

facts and circumstances that the more luxuriant and juicy vegetables are much more readily decomposed than such as are dry. Hence it is, that fresh vegetable substances are much more quickly converted to that state of decay which is suitable for supplying vegetable nourishment, than straw, or hay and other dry materials of the same nature. And among substances of the latter description, buck-wheat has been recommended by English and American farmers as the most economical and convenient for this purpose. And the truth of these recommendations has been well illustrated by an experiment recently made of it as a manure by Daniel P. King, Esq. on his farm in Danvers. Mr. King in a written communication made to your committee of the last year, dated September 1832, says, "I have this season commenced the experiment of ploughing in a green crop for manure, the details of which, I beg leave to communicate. I have been encouraged to make the attempt by favorable results in turning in Roman wormwood and other weeds, after harvesting crops of rye, and I have been, besides, actuated by a desire of answering, so far as I might be able, the wishes of your Society, which has, for several years, offered a liberal premium for the "most satisfactory experiment of turning in green crops as a manure," and which has never within my knowledge been claimed.

Buckwheat has been recommended by foreign as well as American farmers, as the most economical and convenient plant for this purpose. The cost of seed is trifling, it thrives on sterile ground, requires but a short season for its growth, produces a heavy crop, which, when buried, readily decomposes.

July 10th. One acre of level ground, the soil of which is a sandy loam, almost exhausted, for it had been in grass five years, without dressing, and from which a crop of less than five hundred weight of hay had just been taken, was ploughed, and the sward well turned under. The next day one bushel and a half of buckwheat, *Polygonum Tartaricum*, was sown on the ground, broad cast, and well harrowed and rolled. I used no manure, as I understand the object of the experiment to be to ascertain whether, under some circumstances, a green dressing may not be substituted for other fertilizing substances. The season, although cold, has not been very unfavorable for the growth of plants of this description. In less than a month from the time of sowing, the buckwheat began to bloom; it was particularly exuberant, wherever by accident, a small quantity of manure was dropped, which has satisfied me and others who have seen the crop, that a moderate dressing would have greatly increased the product. Till the sward had begun to decompose, and thus afforded more food for the plants, the prospect was not very promising; three quarters of the growth was in the second month.

Sept. 6th. The buckwheat white with its flowers, and still growing, but getting into the milk, and to anticipate the ripening of the seeds was rolled and ploughed in; a revolving cutter was used to prevent clogging, and the old sward was so well rotted that there was little difficulty in the operation of ploughing, and the crop was thoroughly buried."

Mr. King in a subsequent communication to your committee, dated August 23, 1833, says, "in

my communication addressed to the committee of the last year, which has been transmitted to you, I detailed my process of raising and ploughing in a crop of buckwheat for manure, on an acre of land. The last spring the ground was so well pulverized that it was ploughed with facility, and after harrowing and furrowing it was planted with Indian corn, in hills, the same quantity and kind of manure being used, and the same method of cultivation pursued as in other pieces of corn growing in the same field.

The operations of planting and hoeing, on this experimental acre, have been easier than on the other land which had not been once planted, and the crop has better sustained the severity of the drought, to which all lands, in this vicinity, the present summer, have been exposed. The ground will be as mellow, and as well prepared for laying down with grass seed as it is commonly after planting for two years. I submit my experiment for your consideration. On viewing the field (to which I invite your attention) you will determine whether my process has been in any degree satisfactory, and whether a green crop may, under such circumstances be advantageously employed for manure."

Pursuant to the request, contained in Mr. King's last communication, your committee on the 27th of August last, viewed the ground upon which Mr. King's experiment had been made.

They found it remarkably well pulverized, and the growing crop of corn thereon was in a much more promising and flourishing state, and much better sustained the severity of the drought, to which all lands in that vicinity were then exposed, than the crops of corn which were then growing on the contiguous ground of Mr. King, of a similar soil, and which had been cultivated and manured in the ordinary manner.

The committee award to Mr. King, who was the only applicant to them for a premium, the sum of twenty dollars.

D. CUMMINS, *Chairman.*

VOLCANIC ISLAND OFF THE SOUTH COAST OF SICILY.

From the [London] Penny Magazine.

Most of our readers will probably remember the accounts published in the newspapers some time since, of a volcano that suddenly rose from the bosom of the sea, opposite to Sicily, and which, after having attained the size of a considerable island, was rapidly washed away by the waves of the sea from which it rose, and at length totally obliterated.

Through the kindness of John Wright, Esq., an intelligent merchant of Glasgow, who has resided long in Sicily and Naples, we are enabled to give a description of this extraordinary island. Mr. Wright happened to be in Sicily at the time the sub-marine eruption took place, (on the 12th of July, 1831,) and with laudable curiosity determined to repair to the spot. To this end he hired a boat on the 24th of August, (forty-three days after the first appearance of the island,) at Sciacca, on the southern coast of Sicily, which was the town nearest to the volcano, and with an artist, who made drawings on the spot, a physician, and some other Sicilian gentleman, went in quest of

the object that was then exciting so much astonishment and terror.

The party left the shore of Sciacca at nine o'clock in the evening. There was a beautiful bright moon, and they were further favored by a gentle breeze blowing from land in the direction of the island. After some hours Mr. Wright and his companions went to sleep, leaving the easy care of the boat to the sailors. They were awakened a little before sunrise by explosions that warned them they were near the volcano, and rising, they saw, at a short distance, two hills surmounted by a column of smoke. The curious island of Pantellaria, which has evidently been thrown up in the same manner by a sub-marine eruption, though it is now inhabited and partially cultivated, was seen in the distance to the west. They calculated that they had sailed about thirty-six miles, and that the new island was about equi-distant from Sciacca and Pantellaria. It had arisen from a sand bank, which was previously covered (though not with deep water) by the sea, and well known to mariners by the name of "Nerita." This sand bank itself, which extends for some distance, is probably the result of some anterior volcanic convulsion.

Mr. Wright and his friends proceeded eagerly towards the island, when, just as they were within a few oars' length of it, the sun rose in all his glory behind the dark crater, revealing its form, and shining through the dense smoke with singular effect. They began their examination at the north west of the volcano, where it presented the form of a round hill, rising about 120 feet above the level of the sea. They were deterred from a close approach by a thick cloud of white smoke which issued from the side of the hill on a level with the sea. They rowed the boat round the island, keeping about twenty feet from it, until they came to the north east point, where they found that the island was some feet higher than at the part previously examined, and that there was a piece of flat sandy shore which seemed to afford a good landing place. As, however, nobody had hitherto set foot on this new production of nature, some apprehensions as to the safety of so doing, or whether they would not be swallowed up, were entertained by the Sicilians. After some minutes of hesitation one of the sailors, encouraged by Mr. Wright, leaped ashore and found tolerably firm footing. Mr. Wright immediately followed him. The sailor, who had proved himself the most adventurous of his comrades, was yet reluctant to go to any distance from the boat, or to ascend the side of the volcano. Mr. Wright advanced a few steps alone, and perceiving some bright yellow stones that had very much the appearance of gold, he picked up some of them, and cried out, "run! run! my friends! here is gold! here is gold!" This temptation was irresistible—every man left the boat; or, to use the words of one of the Sicilian gentlemen of the party, whose memoranda are before us, they "all leaped on shore, like so many devils careless of life, through the avidity to obtain part of the treasure." (Here we may as well remind our readers that the Sicilians and Neapolitans are commonly inclined to believe the volcanoes sometimes throw out gold. In No. 2 of the 'Penny Magazine,' a communication from a correspondent, who was at Naples at the time, informs us that the Neapolitans collected some of the matter ejected by Mount Vesuvius during the

great eruption of 1822, expecting to find gold in it.) Mr. Wright's companions were soon undeceived; but finding that they nowhere sank much deeper than the ankle in the sandy soil, they readily followed his example, and climbed up to the ridge of the island at the part where it was lowest. Having reached this point with some difficulty, they stood on the edge of a crater that was flanked on either side by a cone or peak of superior elevation. The form of the crater was very irregular—within it, and forty-five feet below its lip or edge on which they stood, and nearly on a level with the surface of the sea, they saw two small lakes of boiling water. One of these lakes was about one hundred and fifty feet in circumference, the other not more than thirty. In the first the color of the water was a light yellow, in the second a reddish yellow; they bubbled here and there and emitted vapor.

The master of the boat (a Maltese) boldly climbed to the top of the highest cone—an exploit not performed without danger, as on that part the island descended almost perpendicularly to the sea, whose waves had already begun to destroy it, and occasionally carried away large masses at a time.

Mr. Wright and his party returned to the strip of beach where the boat was secured, and were amusing themselves by examining and collecting the curious ashes, lapille, and stones which were there deposited, when a rumbling noise and smoke, accompanied by a most pungent sulphureous smell, arose from the crater, and compelled them to embark. They rowed round to the south eastern point of the island, where they found a strip of beach like that which they had left, and lying on it, half dead and stupefied, a fine large *pescè-spada*, or sword fish. This they secured and carried back with them to Sciacca, where they found it weighed upwards of sixty pounds English. The fate of the fish must have arisen from its coming too near the hot and contaminated water which on all sides surrounded the island to a greater or less distance. Indeed, when the party started from this point to continue the circumnavigation of the island, they were obliged to keep nearly a mile at sea, to steer clear of a new sub-marine crater which was forming there, the eruptions from which had changed the color of the waves from blue to deep yellow, and, for the space of half a mile, made them foam and roar in a fearful manner. Even at the distance at which they kept their boat, the air was so charged with sulphur that it almost suffocated them. As they doubled this, the south west extremity, they saw immense clouds of smoke, now black, now white, rising as it were from a rent in the bosom of the sea, and attaining an elevation of 2000 feet.

Having gone entirely round the island, they ascertained that its form was circular, and that it was then about two miles in circumference, but evidently diminishing every day. Besides exciting their curiosity, it should seem that the novel appearance of this volcano had attracted the curiosity of a turtle dove, for as they landed to examine one point, a bird of that gentle species saluted them from the summit of the island with its melancholy note, and then disappeared.

On the 27th of October, 1831, the steam-packet "Francesco Primo" left Naples expressly to visit this volcano, which the Neapolitans had named "L'Isola Ferdinanda." Among the passengers

was an English gentleman, who made some drawings and measurements, and described the island as it then was. From an examination of these, it results that during only two months which had elapsed since Mr. Wright's visit, the island had been reduced to one-seventh of its circumference as measured at that visit. Peaks and elevations had sunk into the sea,—there only remained one, which was much lowered, and no longer retained the appearance of a volcanic crater. This rose in the centre of the island; it was an irregular cone in shape, and composed of fine, heavy, black sand, and very friable scorix. All the rest of the island was a plane whose level scarcely surmounted the superficies of the sea. With the least wind the waves washed over all this level part, which, like the hill, was composed of black sand and scorix, mixed here and there with fragments of lava that seemed to contain a good deal of iron. No smoke then issued from any part of the island, but wherever the visitors dug a little in the plain, a strong heat with smoke escaped. There remained, however, a small lake, the waters of which seemed, from the steam resting on their surface, to be still boiling. These waters had changed their color from yellow to a brownish black. They were ascertained to be sea-waters, mixed with sulphur and other volcanic components, from which they were easily disengaged. In a direction opposite to this small lake, and at the distance of a few feet from the shore of the island as it then was, the sea for a certain space was covered with a bright blue oleous fluid, which produced precisely the same tranquillizing effect that oil does when thrown upon the waves. This fluid was, in all probability, *petroleum*, like that which is found floating on the surface of the Bay of Naples, near the roots of Mount Vesuvius, and in the neighborhood of most volcanoes.

The western side of the central mount was covered with volcanic ashes and saline efflorescence, the white color of which contrasted in a curious manner with the dingy black hue of all the rest of the cone. As the party from the steam-boat ascended the mount, they found two wooden boards stuck deeply in the sand. On the first of these were recorded the names of two members of the French Academy, Messrs. Jonville and Constant Prevot; and on the second the name of an Austrian brig and the name of her commander, who had all visited the island since Mr. Wright's expedition. It was evident to every body that the flat part of the island was rapidly disappearing, and that when the sea had destroyed this, the mount remaining exposed to the direct fury of the waves could not, from the lightness and friability of the materials which composed it, long resist their attack. It was therefore concluded that in a few months the island would no longer exist; and in fact, a very few months afterwards, when Mr. Wright sailed across this part of the Mediterranean, the sea between Sciacca and Pantellaria was perfectly clear, and there remained not the least vestige of the island. He, however, had not the opportunity of examining to what degree the destruction of the volcano had affected the sandbank beneath.

Whichever way the traveller turns on the coasts of Sicily he meets with melancholy evidences of the tremendous effects of volcanic action. The city of Sciacca itself, from which Mr. Wright set

out to visit the new volcano, is surrounded by hot springs, petroleum pits, and caverns of sulphur which still smoke; and about five centuries ago it was entirely destroyed by an eruption. Though the town has been renewed, it has never recovered its former prosperity. Its population, which was 60,000 at the time of the awful catastrophe, now scarcely amounts to 18,000.

ON THE BREEDING, REARING, FATTENING,
AND GENERAL MANAGEMENT OF NEAT CAT-
TLE.

Extracts from the last edition (1833) of the "Complete Grazier."

[Continued from page 213, Vol. II.]

On the treatment and rearing of Calves.

The importance of forwarding calves to maturity with the greatest possible advantage to the full developement of their natural qualities, has necessarily called forth all the ingenuity of the most expert breeders. The most approved, and certainly the best general plan, is to adhere as closely as possible to nature; but various modes of treatment having been adopted in different countries, we shall endeavor to bring into one view every useful fact connected with this subject.

After the calf is produced, the cow uniformly shows an inclination to clean its skin, by licking off, with her tongue, the slimy matter adhering to the young animal. To facilitate this object, it is a frequent practice to throw a handful of common salt over the calf, or to rub a little brandy on it, in case she should disown it, which will cause the dam speedily to perform this necessary duty; and, about an hour after the birth, half a pint of lukewarm gruel is commonly given to the calf, in order to prevent it from taking cold, in lieu of the *beestings*, or first milk drawn from the cow. But however commendable may be the practice of administering gruel—and its use, for the purpose recommended, is not meant to be denied—it should yet be recollected that the *beestings* is provided by nature as the first aliment of the newly born animal; that it is a strong and viscid fluid of a peculiarly nourishing quality, and therefore appears as if intended for the very purpose of early invigoration. The practice which prevails, of depriving the calf of this nourishment is, therefore, objectionable; nor is there any sound reason why it should not be given, notwithstanding the administration of gruel.

There are two modes of feeding calves:—one is, to permit them to run about with the parent cow the whole of the first year; the other mode is to wean them when about a fortnight old, and bring them up by hand.

The former expedient is generally allowed to be productive of the best cattle, and is adopted in those counties where fodder is abundant and cheap; in others, where it is found prudent to reserve a portion of the milk, the following plan is pursued. From the time the calves are dropped till they are able to support themselves, they are allowed to run in the manner abovementioned, but they are prevented from sucking by means of a small piece of leather having little sharp iron spikes fixed upon the outside, which is tied on the upper part of the calf's nose in such a manner as to allow it to feed upon the grass without restraint. Hence, as often as the animal attempts to suck,

this instrument pricks the cow, and prevents her from letting the milk flow till the arrival of the milk-maid, who removes the muzzle; so that while she strips two of the teats, the calf sucks the other two, and after the process of milking is completed, the muzzle is replaced on the calf's nose in the manner above mentioned.

Whether calves are designed to be raised for breed, labor, or feeding, care should be taken that they have a sufficient supply of good pasture; because, if the latter be scanty at first, they rarely, if ever, attain to large growth. The best time for weaning them is, therefore, about that period of the year when the young grass acquires enough succulence both to entice the appetite and to afford complete nourishment without the aid of other food. Calves which are dropped in October or November will thrive greatly by the nourishing pastures into which they may be turned in the ensuing spring, if allowed to suck and properly sheltered throughout the winter; but the milk is too scarce at that season to be commonly bestowed on them; and winter-wearied calves seldom arrive to much perfection.

Various plans have been suggested, and tried with considerable success, for rearing calves without any, or at least with a small quantity of milk. The time of weaning them varies, from one fortnight till they are seven weeks old; but the latter period is preferable, on account of the weak and tender state of the calves, if separated from the dam at an earlier age. In several counties of England, calves, on being taken from the cows, are, with great pains, taught to drink* skimmed milk, in a lukewarm state; for either extreme of heat or cold is hurtful to the beast, and not unfrequently produces fatal consequences; about twelve weeks after which, for three or four weeks, they are fed with lukewarm milk and water. Small wisps of fine hay are then placed within their reach, in order to induce them to eat. Towards the end of May they are turned out to grass, being taken in a few nights, when they have tepid milk and water given them; which is usually continued, though gradually in smaller proportions, during the last month, till they are able to feed themselves, when they totally disregard it: care, however, should be taken that the grass is short and sweet, and by no means rank or sour. Indeed, a spirited American agriculturist† is of opinion that calves taken from the cows are much better in a pasture without water than in a pasture of equal goodness

* Of the patience and attention requisite in teaching calves to drink, a very inadequate idea only can be formed by those who have never witnessed this tedious process. When the animal has fasted two or three hours, the first and second finger of the right hand, being previously well cleaned, are presented to its mouth; of these it readily takes hold, sucking very eagerly. In the mean time, a vessel of lukewarm milk is placed, and supported by the left hand, under the calf's mouth, and, while it is sucking, the right hand is gradually sunk a little way into the milk, so that it may lap a sufficient quantity without stopping its nostrils, which will necessarily compel it to cease, from want of air. Should, however, either from accident or from too sudden precipitation of the hand into the milk, the calf let go its hold, the attempt must be repeatedly renewed till it is crowned with success.

† Mr. E. L. Hommedieu. Transactions of the Agricultural Society of New York.

with water. The reason he assigns, (with which however, we can by no means coincide,) is, that, when indulged with water, they drink too much to supply the want of milk; whereas, when deprived of water, they are forced to eat grass, containing some moisture, and soon learn to allay their thirst, by eating before the dew is dissipated, and on that account eat more than if they could go to water.

In the county of Suffolk, calves are usually weaned soon after Christmas; when they are fed with lukewarm skimmed milk and water, having bran or oats in it, and some very sweet hay by them, till the grass is ready; though if the farmer have carrots, these form an excellent article of food, and render the use of oats unnecessary. About two gallons of milk daily are sufficient for the support of a calf until he begins to eat. It should be given regularly at the same hours; and he should be kept as quiet as possible, as rest is found to materially promote his growth.

In Ayrshire, calves intended to be reared for dairy cows are fed on milk for the first four, five, or six weeks, and are then allowed four or five quarts of new milk at each meal, twice in twenty-four hours. Some never give them any other food when young except milk, and lessen the quantity when they begin to eat grass, or other food, which they generally do when about five weeks old, when grass can be had; and the milk is wholly withdrawn about the seventh or eighth week. But if reared in winter, or before the grass rises in spring, they must be longer supplied with milk, as a calf will not so soon learn to eat hay or straw, nor thrive so well on them alone, as it will on pasture. Others feed partly with meal mixed in the milk after the third or fourth week; or gradually introduce some new whey along with the meal, and afterwards withdraw the milk altogether. Hay-tea, linseed jelly, treacle, &c. are also sometimes used with advantage; but milk, when it can be spared, is by far the best as well as the most natural food.*

Another mode of rearing calves has been suggested by his Grace the late Duke of Northumberland, the design of which is to render the use of new milk unnecessary, while the expense is reduced in the proportion of two-thirds. It is effected in the following manner: let half an ounce of common treacle be well mixed with a pint of skimmed milk, then gradually add one ounce of finely powdered linseed oil-cake, stirring it till the mixture be properly incorporated, after which it is to be added to the remainder of a gallon of milk; and the whole, being made nearly of the temperature of new milk, may then be given to the animal: after a short time, the quantity of pulverized oil-cake may be increased. This method is said to have been advantageously adopted; but Lord Egremont has used linseed jelly, in the proportion of one pint to a gallon of skimmed milk, without treacle, and it did not answer.†

An infusion of hay, or sometimes of pea-haulin, called indiscriminately hay-tea or hay-water, has been also applied to the purpose of rearing calves with the smallest quantity of milk. In order to make this infusion, such a portion of fine, sweet hay, cut once or twice, is put into a small earthen vessel, as will fill it, on being lightly settled with the hand. The vessel is then filled with boiling

water, and carefully closed; at the end of two hours a brown, rich, and sweet infusion will be produced, not unlike alewort, or strong tea, which will remain good for two days, even during summer, and which is to be used in the following manner.

At the end of three or four days after a calf has been dropped, and the first passages have been cleansed, as already noticed, let the quantity usually allotted for a meal be mixed, consisting, for a few days, of three parts of milk, and one part of the hay-tea; afterwards the proportions of each may be equal; then composed of two-thirds of hay-water and one of milk; and, at length, one-fourth part of milk will be sufficient. This preparation (the inventor of which was, many years since, honored with a gold medal by the Dublin Society of Arts) is usually given to the calf, in a lukewarm state, in the morning and evening; each meal consisting of about three quarts at first, but gradually increasing to four quarts by the end of the month. During the second month, beside the usual quantity given at each meal, (composed of three parts of the infusion, and one part of milk,) a small wisp or bundle of hay is to be laid before the calf, which will gradually come to eat it; but, if the weather be favorable, as in the month of May, the beast may be turned out to graze in a fine, sweet pasture, well sheltered from the winds and sun. This diet may be continued till towards the latter end of the third month, when, if the animal graze heartily, each meal may be reduced to less than a quart of milk with hay-water; or skimmed milk, or fresh butter-milk, may be substituted for new milk. At the expiration of the third month, the animal will scarcely require to be fed by hand; though, if this should still be necessary, one quart of the infusion (which during the summer need not be warmed) will be sufficient for a day.

The economical mode above detailed has been adopted in some counties of England, with the addition of linseed-cake finely pulverized and boiled in the hay-tea *only*, to the consistence of a jelly, without employing any milk in the mixture;* and, as so many excellent artificial grasses are now cultivated for the feeding and fattening of cattle, we conceive that an infusion of any one or more of them would be found more nutritious than if it were prepared from the promiscuous mixtures of grass usually occurring in common hay.

In Devonshire, the rules commonly followed in rearing calves are nearly as follows:—The greatest number are usually dropped between Candlemas and May, and some much later; but the most

* In the "Letters and Papers of the Bath and West of England Society," Vol. V. we have a singular instance of success in this mode of rearing, by Mr. Crook. In 1787, he bought three sacks of linseed, value £2 5s., which lasted him three years. One quart of seed was boiled in six quarts of water, for ten minutes, to a jelly, which was given to the calves three times in the course of the day, mixed with a little hay-tea. Thus he was enabled to rear in 1787, seventeen calves; in 1788, twenty-three; and, in 1789, fifteen, without any milk at all. And he states, that his calves thrived much better than those belonging to his neighbors which were reared with milk. Pot-liquor has also been found an excellent substitute for milk; and it is remarkable, that the great ox bred by Mr. Dunhill (already mentioned in the Introductory View) was chiefly reared on it.

* Aiton's Dairy Husbandry, Chap. I. Sect. IV.

† See the Agricultural Survey of Sussex, p. 262.

experienced breeders prefer the earliest. They are permitted to suck as much as they like, three times a day for the first week, after which they are suckled by hand, and fed with warm new milk for three weeks longer. They are then fed, during the two following months, twice a day, with as much warm skim milk as they can drink—in which some feeders mix a small portion of finely pounded linseed-cake, or meal; after which the meals of milk are gradually abated, and at the end of four months they are wholly weaned from milk, and left to themselves at pasture.

In the northern counties of England, it is a common practice to give the calves equal parts of milk and sweet whey, made lukewarm; but, as this mode often produces scouring, or looseness, we think the following method, which was a few years since communicated to the public by a spirited and experienced breeder, is greatly preferable. For the first four or five weeks he fed them regularly, but oftener than is usually done, with new and skimmed milk; at the end of which time his calves were gradually taught to drink strong water gruel, consisting of equal parts of bean or oat-meal, mixed with one-half of buttermilk, and carefully mixed with the gruel after the latter is removed from the fire. This method of treatment he is stated to have pursued with great success for many years; his calves being strong and healthy, while every thing that could tend to retard their growth was effectually prevented.

In the county of Norfolk, calves are fed with skimmed milk, in which is mixed a little wheaten flour; they have also chopped turnips in a trough, and some hay in a low rack. As soon as these animals learn to eat turnips freely, they are no longer supplied with milk, those roots, with the addition of a little hay, furnishing them both with food and drink. The period of raising calves in the above mentioned county is from Michaelmas to Candlemas; but the time of feeding them wholly with turnips varies, according to circumstances or accident. Where there are older calves that have been accustomed to these roots, the younger ones soon acquire the method of breaking and eating them, by picking up the fragments left by the former.

Towards the month of March, those which are first reared, are turned out among the fattening bullocks during the day, and are sheltered in the night; though, if the weather prove favorable, they are in a few days turned out altogether. In the succeeding summer they are kept in clover, or other luxuriant grasses, and the following autumn, are sufficiently strong to stand in the straw or fold-yard. This circumstance is considered as a chief advantage to be derived from rearing calves early in the season; as those which are raised during the spring require two years' nursing.

The subsequent method of raising calves by Mr. William Budd, of Boston, in America, which obtained the prize from the Agricultural Society of Massachusetts, we give in his own language, extracted from his communication to that Society.

"Take the calves, when three days old, from the cows, and put them into a stable by themselves; feed them with gruel, composed of one-third barley, two-thirds oats, ground together very fine, sifting the mixture. Each calf is to receive a quart of gruel morning and evening, and to be made in the following manner: to one quart of the

flour add twelve of water, boil the mixture half an hour, let it stand until milk-warm. In ten days, tie up a bundle of soft hay in the middle of the stable, which they will eat by degrees. A little of the flour, put into a small trough, for them occasionally to lick, is of service. Feed them thus till they are two months' old, increasing the quantity. Three bushels of the above mixture will raise six calves."

Mr. Clift, of the New York Agricultural Society, takes the calf from the cow at two or three days' old; he then milks the cow, and while the milk is warm, teaches the animal to drink by holding his head down into the pail; if the calf will not drink, he puts his hand into the milk, and a finger into the mouth, till the beast learns to drink without the finger. After he has been fed with new milk for a fortnight, the cream is taken off the milk, with which an equal or larger portion of thin flax-seed jelly is mixed, and the whole is given milk-warm. Thus, as the spring is the most favorable season for making butter, he is enabled, during the six or seven weeks the animals are kept previously to weaning, to make as much butter as they are worth; a practice which merits the attention of our English farmers, to whom it will afford a very essential saving, particularly in those counties where butter forms a chief article of manufacture.

In the rearing of calves, much, however, depends on the regularity of feeding them; the common practice is, to supply them with food twice in the day, in the morning and at evening, when they generally receive as large a quantity as their craving appetites can take. Hence the digestive organs are necessarily impaired, and numerous animals either become tainted with disease, or perish from the inattention of their keepers; whereas, by feeding them thrice in the day, at equidistant intervals, and allowing sufficient room for exercise, (when they are not intended to be fattened,) they will not only be preserved in health, but they will also greatly improve in condition.

Whatever food be allowed to young calves, care should also be taken not to change it too suddenly. A calf must have attained a certain degree of strength before it can dispense with the food most natural to its age and thrive without the aid of milk; it should always therefore be allowed as long as possible; but even when that has been withdrawn, and the animal has begun to eat grass, still the substitutes that had been employed in lieu of milk should be partly continued until his appetite prefer the pasture. It is a common notion that provided young stock acquire size, their condition is immaterial; and, after the first winter, they are generally turned into the toughest pasture, and kept during the following winter on straw with, perhaps, a little indifferent hay. This, when they are intended to be sold to the fattening grazier, may be the most profitable mode, and, in some situations, it is the only one that can be adopted; but when they are meant to be reared, for the breed, it is absolutely requisite, as the only means of bringing them to perfect maturity, and improving their qualities, that they should be kept on good pasture during the summer, and allowed roots with some sound hay in the winter, and green food in the spring: a contrary mode, though the most economical, is decidedly disadvantageous; for the worst breed will ultimately be improved by good feeding,

while the best will degenerate under a system of starvation.

With regard to those calves which are intended for the draught, it will be advisable to accustom them, while young, to be handled and stroked, and tied up to the manger; as they may, when they come to be broken in, be handled with less apprehension of danger.

The best time for castrating male, or spaying female calves, undoubtedly is when they are fifteen or twenty days old, as at that time there is least danger, provided they be in full health; though this operation is in some places, particularly in Scotland, deferred till the animals are three years old. Formerly this object was effected by tying a strong cord round the small part of the testicles, near the body, till these became completely dead, when they were either suffered to remain till they dropped spontaneously off, or were cut off, and the animal was perfectly castrated. Modern ingenuity, however, has devised a better means of eradicating the testicles, by excision; but, as this cannot be effected without resorting to an experienced farrier, or cow-doctor, we decline to give any directions respecting an operation which, if unskillfully performed, must prove greatly injurious to the animal. Let it, therefore, suffice to state, that, after the calves are castrated, or spayed, as the difference of sex may require, great care ought to be taken that the wounded part be not exposed to the air, which might otherwise occasion loss of blood or other accidents. For the first two or three days, the animals should be kept quiet and tolerably warm, and be dieted according to their weakness; but they ought not to be allowed too much drink till they are perfectly recovered, after which time they may be treated in the usual manner.

[To be continued.]

[The following extracts relate to the management of draught horses and other branches of rural economy in a country (Nassau in Germany) where habits and circumstances are very different from our own. If the reader should thence derive no useful information, he will at least be amused by the originality of thought and expression exhibited by the author. In explanation of some parts of the management of swine, it may be necessary to mention that the cultivated lands of Nassau are not fenced, and that it is required to guard the stock to restrain their depredations, instead of each proprietor being compelled to secure his fields from their attacks, as with us.]

ON HARNESSING DRAUGHT HORSES.

From "Bubbles from the Brunnens [Medicinal Springs] of Nassau."

* * * * Many years have elapsed, since I first observed that, somehow or other, the horses on the continent manage to pull a heavy carriage up a steep hill, or even along a dead level, with greater ease to themselves than our English horses. If any unprejudiced person would only attentively remark with what little apparent fatigue three small, ill-conditioned horses will draw, not only his own carriage, but very often that huge, overgrown vehicle the French *Diligence*, or the German *Eil-wagen*, I think he would agree with me; but the whole equipment is so unsightly—the rope harness is so rude—the horses without blinkers look so wild—there is so much bluster and noise

in the postillion—that, far from paying any compliment to the turn-out, one is very much disposed at once to condemn the whole thing, and, not caring a straw whether such horses be fatigued or not; to make no other remark than that, in England, one should have travelled at nearly twice the rate with one-tenth of the noise. But neither the rate nor the noise is the point—our superiority in the former and our inferiority in the latter cannot be doubted. The thing to account for, is, how such small weak horses, do actually manage to draw a heavy carriage up-hill with so much ease to themselves. Now, in English, French, and German harness, there exists, as it were, three degrees of comparison as to the manner in which the head of the horse is treated; for, in England, it is elevated or borne up, by what is called the bearing-rein—in France, it is left as nature placed it (there being to common French harness no bearing-rein)—and in Germany, the head is tied down to the lower extremity of the collar, or else the collar is so made that the animal is by it deprived of the power of raising his head. Now passing over, for a moment, the French method, which is in fact, the state of nature, let us for a moment consider which is better—to bear a horse's head up, or to pull it downwards, as in Germany.

"In a state of nature, the wild horse, as every body knows, has two distinct gates or attitudes. If a man, or any still wilder beast, come suddenly upon him, up goes his head; and as he first stalks and then trots gently away—with ears erect, snorting with his nose, and proudly snuffing up the air, as if exulting in his freedom—as one fore leg darts before the other, we have before us a picture of doubt, astonishment, and hesitation, all of which feelings seem to rein him, like a troop-horse, on his haunches; but attempt to pursue him, and the moment he defies you—the moment, determining to escape, he shakes his head, and lays himself to his work—how completely does he alter his attitude!—That instant down goes his head, and from his ears to the tip of his tail there is in his vertebræ an undulating action which seems to propel him, which works him along, and which, it is evident, you could not deprive him of without materially diminishing his speed. Now, in harness, the horse has naturally the same two gaits or attitudes, and it is quite true that he can start away with a carriage either in the one or the other; but the means by which he succeeds in this effort, the physical powers which he calls into action, are essentially different: in the one case he works by his muscles, and in the other by his own dead, or rather living, weight. In order to grind corn, if any man were to erect a steam-engine over a fine strong running stream, we should all say to him, "Why do you not allow your wheel to be turned by cold water instead of hot? Why do you not avail yourself of the *weight* of the water, instead of expending your capital in converting it into the power of steam? In short, why do you not use the simple resource which nature has presented ready made to your hand?" In the same way, the German might say to us, "We acknowledge a horse can drag a carriage by the power of his muscles, but why do you not allow him to drag it by his weight?"

"Let any one observe a pair of English post-horses dragging a heavy weight up a hill, and he will at once see that the poor creatures are work-

ing by their muscles, and that it is by sheer strength that the resistance is overcome; but how can it be otherwise?—their heads are higher than nature intended them to be even in *walking* in a state of liberty, carrying no weight but themselves; the balance of their bodies is, therefore, absolutely turned *against*, instead of leaning in favor of, their draught; and if my reader will but pass his hands down the back sinews of our stage-coach or post-chaise horses, he will soon feel (though not so keenly as they do) what is the cruel and fatal consequence. It is true, that, in ascending a very steep hill, an English postillion will occasionally unhook his bearing-reins; but the jaded creatures, trained for years to work in a false attitude, cannot in one moment get themselves into the scientific position which the German horses are habitually encouraged to adopt. Besides this, we are so sharp with our horses—we keep them so constantly on the *qui vive*, or, as we term it, in hand, that we are always driving them from the use of their weight to the application of their sinews. That the figure and attitude of a horse working by his sinews are infinitely prouder than when he is working by his weight—(there may exist, however, false pride among horses as well as men)—I most readily admit; and, therefore, for carriages of luxury, where the weight bears little proportion to the powers of the noble animals employed, I acknowledge that the sinews are more than sufficient; but to bear up the head of a poor horse at plough, or any other slow heavy work, is, I conceive, a barbarous error, which ought not to be persisted in.

ON THE USE OF BLINKERS (OR BLINDS) FOR CARRIAGE HORSES.

From the same.

Odd as it may sound, it is nevertheless true, that German-post horses have seldom what we should term bridles. Snaffle-bits ending with T's instead of rings, being put into their mouths, are hooked (by these T's) to iron billets in the head-pieces of common stable halters, by which arrangement, to feed the animal, it is only necessary, without taking them from the carriage, to unhook one end of the bits, which then immediately falls from their mouths; a slight trough on four legs is then placed before them, and the traveller generally continues, as I did, to sit in his carriage watching the horses eating up slices of black rye bread.

In England, there is no surer receipt known for making a pair of horses suddenly run away with one's carriage, than by taking off their blinkers to allow them to see it; but though our method decidedly suits us the best, yet in Germany the whole system of managing horses from beginning to end is completely different from ours. Whether there is most of the horses in a German, or of the German in a horse, is a nice point on which people might argue a great deal; but the broad fact really is, that Germans live on more amicable terms with their horses, and understand their dispositions infinitely better, than the English; in short, they treat them as horses, while we act towards them, and drill them, as if they were men; and in case that any one should doubt that Germans are better horsemasters than we are, I beg to remind them of what is perfectly well known to the British army—namely, that in the peninsula

lar war the cavalry horses of the German Legion were absolutely fat, while those of our regiments were skin and bone.

In a former chapter I have already endeavored to explain, that instead of reining a horse's head *up*, as we do, for draught, the Germans encourage the animal to keep it *down*; but besides this, in all their other arrangements they invariably attend to the temper, character, and instinct of the beast. For instance, in harness, they entrust these sensible animals (who are never known to forget what they have once seen) with the free use of their eyes. The horses see the wheel strike a stone, and they avoid the next one; if they drag the carriage against a post, they again observe the effect; and seeing at all times what is behind them, they know that by kicking they would hurt themselves: when passengers and postillion dismount, from attentive observation, they are as sensible as we are that the draught will suddenly become less, and, consequently, rejoicing at being thus left to themselves, instead of wishing to run away, they invariably are rather disposed to stand still.

As soon as getting tired, or as we are often too apt to term it, "lazy," they see the postillion threaten them with his whip, they know perfectly well the limits of his patience, and that after eight, ten, or twelve threats, there will come a blow: as they travel along, one eye is always shrewdly watching the driver—the moment he begins the heavy operation of lighting his pipe, they immediately slacken their pace, knowing, as well as Archimedes could have proved, that he cannot strike fire and them at the same time; every movement in the carriage they remark; and to any accurate observer who meets a German vehicle it must often be perfectly evident that the poor horses know and feel, even better than himself, that they are drawing a coachman, and three heavy baronesses with their maid, and that to do that on a hot summer's day is—no joke. When their driver urges them to proceed, he does it by degrees; and they are stopped, not as bipeds, but in the manner quadrupeds would stop themselves.

Now, though we all like our own way best, let us for a moment (merely while the horses are feeding) contrast with the above description our English mode of treating a horse.

In order to break in the animal to draught, we put a collar round his neck, a crupper under his tail, a pad on his back, a strap under his belly, with traces at his sides, and lest he should see that though these things tickle and pinch, they have not power to do more, the poor intelligent creature is blinded with blinkers; and in this fearful state of ignorance, with a groom or two at his head and another at his side, he is, without his knowledge, fixed to the pole and splinter-bar of a carriage. If he kicks, even at a fly, he suddenly receives a heavy punishment, which he does not comprehend—something has struck him, and has hurt him severely; but as fear magnifies all danger, so, for aught we know, or care, he may fancy that the splinter-bar, which has cut him, is some hostile animal, and expect when the pole bumps against his legs, to be again assailed in that direction.

Admitting that in time he gets accustomed to these phenomena, becoming what we term steady in harness, still to the last hour of his existence, he does not clearly understand what it is that is hampering him, or what is that rattling noise

which is always at his heels: the sudden sting of the whip is a pain with which he gets but too well acquainted, yet the "unde derivatur" of the sensation he cannot explain—he neither knows when it is coming, nor where it comes from. If any trifling accident, or even irregularity, occurs—if any little harmless strap, which ought to rest upon his back, happens to fall to his side—the poor, noble, and intelligent animal, deprived of his eyesight, the natural lanterns of the mind, is instantly alarmed: and though from constant heavy draught he may literally, without metaphor, be on his last legs, yet if his blinkers should happen to fall off, the sight of his own master—of his very own pimple-faced mistress—and his own fine yellow carriage in motion—would scare him so dreadfully, that off he would probably start, and the more they all pursued him the faster would he fly!

MANNER OF SHOEING HORSES IN GERMANY.

From the same.

In passing the shop of a blacksmith, who lived opposite to the Goldene Kette, the manner in which he tackled and shod a vicious horse always amused me. On the outside wall of the house, two rings were firmly fixed; to one of which the head of the patient was lashed close to the ground; the hind foot to be shod, stretched out to the utmost extent of the leg, was then secured to the other ring about five feet high, by a cord which passed through a cloven hitch, fixed to the root of the poor creature's tail.

The hind foot was consequently very much higher than the head; indeed it was so exalted, and pulled so heavily at the tail, that the animal seemed to be quite anxious to keep his other foot on *terra firma*. With one hoof in the heavens, it did not suit him to kick; with his nose pointed to the infernal regions he could not conveniently rear, and as the devil himself was apparently pulling his tail, the horse at last gave up the point, and quietly submitted to be shod.

THE MANAGEMENT OF SWINE IN A COUNTRY WITHOUT FENCES.

From the same.

Every morning at half-past five o'clock, I hear, as I am dressing, the sudden blast of an immense long wooden horn, from which always proceed the same four notes. I have got quite accustomed to this wild reveille, and the vibration has scarcely subsided, it is still ringing among the distant hills, when, leisurely proceeding from almost every door in the street, behold a pig! Some from their jaded, care-worn, draggled appearance, are evidently leaving behind them a numerous litter; others are great, tall, monastic, melancholy looking creatures, which seem to have no other object left in this wretched world than to become bacon; while others are thin, tiny, light-hearted, brisk, petulant piglings, with the world and all its loves and sorrows before them. Of their own accord these creatures proceed down the street to join the herdsman, who occasionally continues to repeat the sorrowful blast from his horn.

Gregarious, or naturally fond of society, with one curl in their tails, and with their noses almost touching the ground, the pigs trot on, grunting to themselves and to their comrades, halting only

whenever they come to any thing they can manage to swallow.

I have observed that the old ones pass all the carcasses, which trailing to the ground, are hanging before the butchers' shops, as if they were on a sort of *parole d'honneur* not to touch them; the middle-aged ones wistfully eye this meat, yet jog on also, while the piglings, who (so like mankind) have more appetite than judgement, can rarely resist taking a nibble; yet, no sooner does the dead calf begin again to move, than from the window immediately above out pops the head of a butcher, who, drinking his coffee, whip in hand, inflicts a prompt punishment, sounding quite equal to the offence.

As I have stated, the pigs, generally speaking, proceed of their own accord; but shortly after they have passed, there comes down our street a little bareheaded, barefooted, stunted dab of a child, about eleven years old,—a Flibbertigibbet sort of creature, which in a drawing, one would express by a couple of blots, the small one for her head, the other for her body; while streaming from the latter, there would be a long line ending in a flourish, to express the immense whip which the child carries in its hand. This little goblin page, the whipper-in, attendant, or aid-de-camp of the old pig-driver, facetiously called at Langen-Schwalbach, the "Schwein-general," is a being no one looks at, and who looks at nobody. Whether the hofs of Schwalbach are full of strangers, or empty—whether the promenades are occupied by princes or peasants—whether the weather is good or bad, hot, or rainy, she apparently never stops to consider: upon such vague subjects, it is evident she never for a moment has reflected. But such a pair of eyes, for a pig, have perhaps seldom beamed from human sockets! The little intelligent urchin knows every house from which a pig ought to have proceeded; she can tell by the door being open or shut, and even by footmarks, whether the creature has joined the herd, or whether having overslept itself, it is still snoring in its sty—a single glance determines whether she shall pass a yard or enter it; and if a pig, from indolence or greediness, be loitering on the road, the sting of the wasp cannot be sharper or more spiteful than the cut she gives it. As soon as finishing with one street, she joins her general in the main road, the herd slowly proceed down the town.

As I followed them this morning, they really appeared to have no hams at all; their bodies were as flat as if they had been squeezed in a vice; and when they turned sideways, their long sharp noses and tucked-up bellies, gave to their profile the appearance of starved grey-hounds.

As I gravely followed this grunting, unearthly looking herd of unclean spirits, through that low part of Langden-Schwalbach which is solely inhabited by Jews, I could not help fancying that I observed them holding their very breaths, as if a loathsome pestilence were passing; for though fat pork be a wicked luxury—a forbidding pleasure which the Jews has been supposed occasionally in secret to indulge in, yet one may easily imagine that such very lean ugly pigs have not charms enough to lead them astray.

Besides the little girl who brought up the rear, the herd was preceded by a boy of about fourteen, whose duty it was not to let the foremost, the more enterprising, or in other words, the most empty

pig advance too fast. In the middle of the drove, surrounded like a shepherd by his flock, slowly stalked the "Schwein General," a wan, spectre looking old man, worn out, or nearly so, by the arduous and every-day duty of conducting, against their wills, a gang of exactly the most obstinate animals in creation. A single glance at his jaundiced, ill-natured countenance, was sufficient to satisfy one that his temper had been soured by the vexatious contraries and "untoward events" it had met with. In his left hand he held a staff to help himself onwards, while round his right shoulder hung one of the most terrific whips that could possibly be constructed. At the end of a short handle, turning upon a swivel, there was a lash about nine feet long, formed like the vertebrae of a snake, each joint being an iron ring, which decreasing in size, was closely connected with its neighbor by a band of hard greasy leather. The pliability, the weight, and the force of this iron whip, rendered it an argument which the obstinacy even of the pigs was unable to resist; yet as the old man proceeded down the town, he endeavored to speak kindly to the herd; and as the bulk of them preceded him, jostling each other, grumbling and grunting on their way, he occasionally exclaimed, in a low, hollow, worn-out tone of encouragement, "Nina! Anina!" (drawing of course, very long on the last syllable.)

If any little savory morsel caused a contention, stoppage, or constipation on the march, the old fellow slowly unwound his dreadful whip, and by merely whirling it round his head, like reading the Riot Act, he generally succeeded in dispersing the crowd; but if they neglect this solemn warning, if their stomachs proved stronger than their judgments, and if the group of greedy pigs still continued to stagnate—"Arriff!" the old fellow exclaimed, and rushing forwards, the lash whirling round his head, he inflicted, with strength which no one could have fancied he possessed, a smack that seemed absolutely to electrify the leader. As lightning shoots across the heavens, I observed the culprit fly forwards, and for many yards continuing to sidle towards the left, it was quite evident that the thorn was still smarting in his side; and no wonder, poor fellow! for the blow he received would almost have cut a piece out of a door.

As soon as the herd got out of the town, they began gradually to ascend the rocky barren mountain which appeared towering above them; and then the labors of the Schwein general and his staff became greater than ever; for as the animals from their solid column began to extend or deploy themselves into line, it was necessary constantly to ascend and descend the slippery hill, in order to outflank them. "Arriff!" vociferated the old man, striding after one of his rebellious subjects; "Arriff!" in a shrill tone of voice was re-echoed by the lad, as he ran after another; however, in due time, the drove reached the ground which was devoted for that day's exercise the whole mountain being thus taken in regular succession.

The Schwein general now halted, and the pigs being no longer called upon to advance, but being left entirely to their own notions, I became exceedingly anxious attentively to observe them.

No wonder, poor reflecting creatures! that they had come unwillingly to such a spot—for there appeared literally to be nothing for them to eat

but hot stones and dust; however, making the best of the bargain, they all very vigorously set themselves to work. Looking up the hill, they dexterously began to lift up with their snouts the largest of the loose stones, and then grubbing their noses into the cool ground, I watched their proceedings for a very long time. Their tough wet snouts seemed to be sensible of the quality of every thing they touched; and thus, out of the apparently barren ground, they managed to get fibres of roots, to say nothing of worms, beetles, or any other travelling insects they met with. As they slowly advanced working up the hill, their ears most philosophically shading their eyes from the hot sun, I could not help feeling how little we appreciate the delicacy of several of their senses, and the extreme acuteness of their instinct.

In this situation do the pigs remain every morning for four hours, enjoying little else than air and exercise. At about nine or ten o'clock, they begin their march homewards, and nothing can form a greater contrast than their entry into their native town does to their exit from it.

Their eager anxiety to get to the dinner-trough that awaits them is almost ungovernable; and they no sooner reach the first houses of the town, than a sort of "sauve qui peut" motion takes place; away each then starts towards his dulce domum: and it is really curious to stand still and watch how very quickly they canter by, greedily grunting and snuffling, as if they could smell with their stomachs, as well as their noses, the savory food which was awaiting them.

At half-past four, the same four notes of the same horn are heard again; the pigs once more assemble—once more tumble over the hot stones on the mountain—once more remain there for four hours—and in the evening once again return to their styes.

Such is the life of the pigs not only of Langen-Schwalbach, but of those of every village throughout a great part of Germany: every day of their existence, summer and winter, is spent in the way I have described. The squad consists here of about a hundred and fifty, and for each pig the poor old Schwein general receives forty kreuzers, (about 13d.) for six months' drilling of each recruit. This income, therefore, is about £20 a year, out of which he has to pay the board, lodging, and clothing of his two aid-de-camps; and when one considers how unremittingly this poor fellow creature has to contend with the gross appetites, sulky tempers, and pig-headed disposition of the swinish multitude, surely not even the most niggardly reformer would wish to curtail his emoluments.

HARVEST LABORS IN GERMANY, AND WORKING COWS.

From the same.

All this day I have been strolling about the fields watching the getting in of the harvest. The crops of oats, rye, and wheat (principally bearded) are much heavier than any one would expect from such light and apparently poor land; but the heavy dews which characterise the summer climate of this high country impart a nourishment which, in richer lands, often lies dormant from drought. In Nassau, the corn is cut principally by women, who

use a sickle so very small and light, that it seems but little labor to wield it. They begin early in the morning, and with short intervals of rest continue till eleven o'clock, when the various village bells suddenly strike up a merry peal, which is a signal to the laborers to come home to their dinners. It is a very interesting scene to observe, over the undulating surface of the whole country, groups of peasants, brothers, sisters, parents, &c., all bending to their sickles, to see children playing round infants lying fast asleep on the blue smock-frocks placed under the shade of the corn sheafs. It is pleasing to remark the rapid progress which the several parties are making; how each little family, attacking its own patch or property, works its way into the standing corn, leaving the crop prostrate behind them; and then, in the middle of this simple, rural, busy scene, it is delightful indeed, to hear from the belfry of their much revered churches a peal of cheerful notes, which peacefully sound "lullaby" to them all. In a very few seconds the square fields and little oblong plots are deserted, and then the various roads and paths of the country suddenly burst in lines upon the attention, each being delineated by a string of peasants, who are straggling one behind the other, until paths in all directions are seen converging towards the parent village churches, which seem to be attracting them all.

As soon as each field of corn is cut, it is bound into sheaves, about the size they are in England: seven of these are then made to lean towards each other, and upon them all is placed a large sheaf reversed, the ears of which hanging downwards form a sort of thatch, which keeps this little stack dry until its owner has time to carry it to his home. It generally remains many days in this state, and after the harvest has been all cut, the country covered with these stacks resembles a vast encampment.

The carts and wagons used for carrying the corn are exceedingly well adapted to the country. Their particular characteristic is excessive lightness, and indeed, were they heavy, it would be quite impossible for any cattle to draw them up and down the hills. Occasionally they are drawn by horses—often by small active oxen; but cows more generally perform this duty, and with quite as much patience as their mistresses, at the same moment are laboring before them at the sickle. The yoke, or beam, by which these cows are connected, is placed immediately behind their horns; a little leather pillow is then laid upon their brow, over which passes a strap that firmly lashes their heads to the beam, and it is, therefore, against such soft cushions that the animals push to advance: and thus linked together for life, by this sort of Siamese band, it is curious to observe them eating together, then by agreement raising their heads to swallow, then again standing motionless chewing their cud, which is seen passing and repassing from the stomach to the mouth.

At first, when standing near them, I smelt from their breath their sweet fresh milk, it seemed hard that they should thus be as it were, domestic candles, lighted at both ends; however, verily do I believe that all animals prefer exercise, or even hard work, to any sort of confinement, and if so, they are certainly happier than our stall-fed cows, many of which, in certain parts of Britain, may be seen with their heads fixed economically for

months between two vertical beams of wood. The Nassau cows certainly do not seem to suffer while working in their light carts; as soon as their mistress advances, they follow her, and if she turns and whips them, then they seem to hurry after her more eagerly than ever.

It is true, hard labor has the effect of impoverishing their milk, and the calf at home is consequently (so far as it is concerned) a loser by the bargain; however, there is no child in the peasant's family who has not had cause to make the same complaint, and therefore, so long as the laborer's wife carries her infant to the harvest, the milch cow may very fairly be required to draw to the hovel what has been cut by her hands.

Nothing can be better adapted to the features of the country, nothing can better accord with the feeble resources of its inhabitants, than the equipment of these economical wagons and carts: the cows and oxen can ascend any of the hills, or descend into any of the valleys; they can, without slipping, go sideways along the face of the hills, and in crossing the green swampy grassy ravines, I particularly remarked the advantage of the light wagon drawn by animals with cloven feet, for had one of our heavy teams attempted the passage, like a set of flies walking across a plate of treacle, they would soon have become unable to extricate even themselves. But in making the comparison between the horse and the cow, (as far as regards Nassau husbandry,) I may observe, that the former has a very expensive appetite, and wears very expensive shoes; as soon as he becomes lame he is useless, and as soon as he is dead, he is carrion. Now a placid, patient Langen-Schwalbach cow, in the bloom of her youth, costs only two or three pounds; she requires neither corn nor shoeing: the leaves of the forest drawn by herself to the village, form her bed, which in due time she carries out to the field as manure: there is nothing a light cart can carry which she is not ready to fetch, and from her work she cheerfully returns to her home to give milk, cream, butter, and cheese to the establishment; at her death, she is still worth eleven kreuzers a pound as beef; and when her flesh has disappeared, her bones, after being ground at the mill, once again appear upon her master's fields, to cheer, manure, and enrich them.

STEAM CARRIAGES ON COMMON ROADS.

From the London Morning News.

These wonderful machines are now constructed with sufficient mechanical skill, amount of power, safety, and general efficiency, to ensure their successful employment on any good road, and it is certainly time for our capitalists to turn their attention to them as legitimate objects of support, and as offering the means of a profitable investment. From the earliest development of the capabilities of steam, as applicable to purposes of locomotion, on properly constructed roads, we have carefully watched the progress made by different inventors, and have on many occasions borne testimony to the unceasing efforts of two of the most persevering and deserving among them; of two who have from time to time, promised less and performed more than any of their contemporaries—we mean Col. Macaroni and Mr. Hancock. On Saturday we had a trip on the Edgeware road, with the second coach constructed by the gallant Colonel.

Starting from the Paddington wharf, No. 19, we proceeded on the road in the most surprising style, the coach being turned, checked, stopped or having its speed increased under the complete command of the conductor. About three miles out we passed a stage coach, whose four horses were put to their utmost speed, with a comparative velocity to that with which the stage coach would have passed a wagon, our rate being at that time about eighteen miles an hour. Soon after this we ascended Windmill-hill with perfect ease; although, in consequence of the road undergoing repair, the part we had to ascend was cut into deep ruts covered with dry soil and dust from three to six inches deep; forming perhaps, the most uncertain and disadvantageous fulcrum on which the wheel of a steam-carriage could ever have to act. We arrived at Welch Harp Inn, which is several perches over the five miles from our starting place, and turned the coach in the direction of Paddington, in precisely twenty minutes; having performed the distance, inclusive of stopping at the turnpike, and on two other occasions, and despite the bad condition of Windmill-hill, at the extraordinary average rate of fifteen miles an hour. Our return occupied the same period of time; and after this completion of the trip we made the round of Paddington-green to gratify some gentlemen who had not arrived in time to witness the more extensive trial. Among our fellow passengers on these occasions were Jerome Bonaparte, ex-King of Westphalia, Prince Jerome his son, the Duke de Montfort, the Marquis Azolino, M. Vigne de Marville, and other distinguished foreigners.

From the same paper.

Sir,—You certainly have made a mistake in saying that the coach, on Saturday last, went at eighteen miles the hour, when it overtook and passed the stage whose four horses were "put to their utmost speed, with a velocity comparative to that with which the stage coach would have passed a wagon."

Wyatt, of the Watford and Aylesbury coach, the one to which you refer, is very angry at your asserting that his fine team of horses were overtaken and passed in the manner you speak of by the steamer, when the latter did not perform more than eighteen miles the hour! Wyatt knows the steamer well; he was once beaten by it going up Windmill-hill; and he says—and I say—and all the others say, that when the steam carriage overtook him, and passed him on Saturday, it was undoubtedly at a pace of more than twenty-four miles the hour.

We have many times done two miles in five minutes, and you shall see it done again whenever you are so disposed.

You show that the speed of the whole ten miles, including several stoppages and the turnpike, &c, was above fifteen miles the hour. Surely to overtake and pass a team of four fine horses at their "utmost speed" as we did, must have required more than eighteen?

But to set the matter at rest in your mind, I will keep a seat for you in the carriage on an occasion which will offer in a few days, of putting to the test at their utmost speed, a chosen team of horses, a fourteen mile heat, on the most hilly and softest

road out of London. I have the honor to be, sir, your most obedient servant,

FRANCIS MACERONI.

Wharf, 19, Paddington-green, May 26, 1834.

FAT SHEEP IN SUMMER, AND MAGGOTS IN THE HEAD.

From the Genesee Farmer.

A writer in the Farmer's Journal, after stating that he applies tar to the roots of the horns of sheep, and puts a little in their noses and mouths, "as affording the best security against the maggot in the head," gives the following remarks on the management of sheep in the summer:

"I am careful to have none of my sheep, except those I intend for market, get very fat during the summer. I have heard it remarked, and I believe it, that after once very fat, a sheep will never arrive at the same point again. Sheep which get fat during the summer, certainly do not do as well in the fall and winter. About the middle of September I give my sheep the best feed I can, and the middle of October begin to feed sparingly with turnips, potatoes, or some kind of grain. When the time arrives for yarding, which I do rather late, I separate my flock in the following manner: In one yard I put my rams and weathers, except such of the former as have become very poor during the time of running with ewes. In the second I put my last spring lambs; in the third all my healthy ewes, and in the fourth my old and weak (but not diseased) ewes. A sixth department is a kind of hospital, into which every sheep is removed as soon as discovered to be afflicted with disease. This arrangement I consider very important, as it affords an opportunity for treating every class of sheep in the manner judged most proper for their circumstances. I have known instances in which the lot of old and feeble ewes have come out much improved in the spring, and have procured a good fleece, and raised fine likely lambs. I always intend, however, to turn my sheep before they get so old as to become enfeebled; as they are more likely to acquire those diseases which spread through the flock.

MACHINE FOR GETTING OUT STAVES FOR BARRELS.

From the Rochester Democrat.

Messrs. Levi and Luther Benton, citizens of this county, have lately invented a Stave Machine, which is now in successful operation in the village of Scottsville. The utility of this invention consists in the despatch with which it operates, the facilities it affords for manufacturing staves from timber before unavailable for that purpose, and the perfect finish it gives to a barrel constructed from staves prepared by it. It is satisfactorily ascertained, that with the labor of three men, it will saw, dress, and joint, one thousand staves in an hour, and that this can be done from any description of timber without reference to the kind, or the irregularity of the grain; and when finished they are superior to those wrought by hand, both in regularity of their form and appearance of their surface. I will not occupy room, in detailing its peculiar and ingenious construction. It is of itself a mechanical curiosity worthy the personal examination of every inquiring man, and particularly

those immediately interested in its beneficial results. The machine first cuts the stave to its proper thickness by means of a circular saw, then with a chisel attached to a perpendicular wheel, gives it a convex and a concave shape, leaving the two surfaces smooth, and by a third process, cuts it to its proportioned width. The importance of this invention is already felt to a very considerable extent throughout the country. Oak timber in many sections cannot be obtained at the greatest cost and trouble, and in most or all milling districts is procured at a great inconvenience and expense. The rapidly increasing agriculture of the northern and western states, and the corresponding decrease of oak timber, will very soon realize to the community, the policy of its adoption generally, and a very few years will render this, or a like invention indispensable.

D. K. B.

DISEASES OF WHEAT.

[Notwithstanding all the labors of agriculturists and of the men of science who have written on the diseases of wheat, there are few subjects more enveloped in obscurity, or offering more difficulty to the novice who endeavors to investigate the causes of any of the many diseases to which this plant is subject. It is not so much on account of the errors and mistakes of the various writers, (considerable as they doubtless are,) as to the facts they have asserted, that the difficulty has arisen, as to the want of *clearness and uniformity* in the use of names, and the uncertainty as to what disease is meant by any one particular name. The terms *blight, mildew, rust, blast, smut, scab, stud, stunt*, have been used in either England or this country, so loosely, that it cannot be known what is meant by either, without a very particular description of the symptoms of the disease: and the symptoms are seldom described plainly enough for this end. A great service might be rendered by any person, who, from his acquaintance with the actual diseases, and with what has been published concerning them, could adjust properly terms and descriptions, and merely give a clear account of the opinions entertained in England and America, of the causes and remedies of the diseases of wheat, and how far those of the one country are identical with those of the other. This would enable us at least to profit by the knowledge already existing, but which is sealed up from most persons by the improper use of names, either by the writer or reader—and doubts are thus created, even as to the terms that are properly applied. But far greater benefits might be conferred on agriculture in this respect, if scientific men would pursue the investigation, and not only define the diseases, but search out their causes, and thence the remedies.

The three following papers on as many different diseases in wheat, are uncommonly satisfactory. The particular descriptions given leave no doubt as to the identity of the first two with those we know as the *smut*, and the *blast* or *black-head*. The writer has traced these diseases to their hidden causes by a course of patient and careful investigation—and thence has correctly deduced that the proper means to avoid the evil is to destroy on the seed wheat, the sources of the diseases which he had there discovered. Without

this course of reasoning, or knowing the cause of the disease, farmers have accidentally found the benefit of liming the seed to prevent smut ("the pepper brand") in wheat—and an experiment published in the Farmers' Register, (Vol. I. p. 275) shows the like benefit from a similar treatment of oats infected with the blast, (or "dust brand.") These coincidences of accidental practice with theoretical reasoning are highly satisfactory: and though, in these cases, accident had discovered the remedy more early than science had made known the cause, it does not therefore lessen the value of the latter mode of investigation. A very similar discovery has lately been published (page 219 of Farm. Reg.) of the eggs of the very destructive turnip fly being discovered on the seeds, *before* any effectual means had been found to arrest its ravages. If this fact is established, it leads at once to an obvious mode of destroying the insect, by some kind of wash for the seeds. The disease of wheat described last in order by the writer, if it belongs to this country, is not known to us, but may be so to more close observers.

The descriptions of the author are accompanied by a number of figures, which serve, as well as his descriptions, to prove the identity of the first two diseases with those above named. But these figures are not necessary to farmers who know the actual diseases; and others which represent microscopic fungi and animalculæ, would be of no use to any who did not seek for the originals with powerful magnifying glasses. To save a considerable expense therefore, the figures are omitted, and also those passages which merely refer to the figures.]

THE SMUT BALLS OR PEPPER BRAND.

From the Penny Magazine.

[We are indebted for the following interesting paper to Francis Bauer Esq., a gentleman who has attained a most deserved celebrity for his valuable discoveries connected with the diseases of grain, the most important article of human food.]

The existence of this destructive disease in wheat has long been known to every agriculturist in England, as well as by those on the continent; but the real cause of it is yet very little known; not only by the practical cultivator, but even by scientific authors. Such erroneous and contradictory opinions have been advanced that the farmer cannot possibly derive any satisfactory information from them. I hope, however, that the following observations and illustrations of facts may be acceptable to some of the numerous readers of the Penny Magazine.

This disease is occasioned by the seeds of an extremely minute parasitic fungus, of the genus *uredo*, being absorbed by the roots of the germinating wheat grains and propelled by the rising sap, long before the wheat blossoms, into the young germen or ovum, where the seeds of the fungi vegetate, and rapidly multiply, thereby preventing, not only the fecundation of the ovum, but even the development of the parts of fructification. In consequence no embryo is produced in an infected germen, which however continues to grow as long as the sound grains do, and, when the sound grains arrive at maturity, the infected ones are generally larger than, and are easily distinguished from, the sound grains, by their darker green color, and from the ova retaining the same shape and form

which they had at the time when infection took place.

The name of this disease is also as undecided and various as the hitherto supposed causes of its existence, the most prevailing names in England, being *Smut Ball*, *Pepper Brand*, and *Brand Bladders*; and many others have been given to it, not only by the farmers in almost every county, but also by scientific naturalists.

No author has yet been found who mentions or describes this species of *uredo*, the distinguishing characteristic of which being its extremely offensive smell; I think the most proper specific name for it would be that of *uredo fetida*.

The earliest period at which I discovered the parasite within the cavity of the ovula of a young plant of wheat (the seed grain of which had been inoculated with the fungi of *uredo fetida*, and sown the 14th of November, 1805) was the 5th of June, 1806, being sixteen days before the ear emerged from its hose, and about twenty days before the sound ears, springing from the same root, were in bloom. At that early stage the inner cavity of the ovum is very small; and, after fecundation, is filled with the albumen or farinaceous substance of the seed, and already occupied by many young fungi, which, from their jelly-like root or spawn, adhere to the membrane which lines the cavity, and from which they can be easily detached in small flakes with that spawn: in that state their very short pedicles may be distinctly seen. At first the fungi are of a pure white color, and when the ear emerges from its hose the ovum is much enlarged, but still retains its original shape, and the fungi rapidly multiplying, many have then nearly come to maturity, assumed a darker color, and having separated from the spawn, lie loose in the cavity of the ovum: the infected grains continue growing, and the fungi continue to multiply till the sound grains have attained their full size and maturity, when the infected grains are easily distinguished from the sound ones by being generally larger, and of a darker green color; and if opened, they appear to be filled to excess with these dark-colored fungi: but the grains infected with the *uredo fetida* very rarely burst, and these fungi are seldom found on the outside of the grain; but if the grain be bruised they readily emit their offensive smell, which is worse than that from putrid fish. When the sound grains are perfectly ripe and dry, and assume their light brown color, the infected grains also change, but to a somewhat darker brown, retaining however the same shape which the ovum had at its formation; the rudiments of the stigma also remaining unaltered.

If the infected grain be cut in two, it will be found to consist solely of the outermost integument of the ovum, filled with the ripe black fungi, without any tract of the embryo or albumen.

Plants of wheat infected with the *Pepper Brand* may be easily distinguished in the field by their size, being generally several inches higher than plants not infected, and larger in bulk; and I have found in all instances a greater number of stems produced from the same root, the ears containing more spickets, and those spickets more perfect grains, than were contained in those of sound plants, of the same seed, and growing in the same field.

One plant, produced from seed which I had inoculated, had twenty-four complete stems and

ears, some of the stems with the ears measuring above five feet every part of the plant proportionally large, and all the ears entirely infected. Another specimen had eight stems from the same root five of them were above six feet high, and the ears entirely infected; the other three stems were considerably shorter, their ears smaller, and their grains perfectly sound.

This enlargement of the plant, however, is not to be attributed to the infection, but is undoubtedly the consequence of a luxurious vegetation, produced by a rich or moist soil, which secures and promotes the infection more than a dry or moderately rich soil.

Neither does this disease always affect the entire ear: I found some ears having one side infected, whilst the opposite side was perfectly sound. Sometimes five or six perfectly sound grains are found in an infected ear, and a few thoroughly infected grains are found in an otherwise sound ear. The infected grains are always in the last spicket at the apex of the ear; from which it appears that the infecting seed of the fungi did not reach the ovum before fecundation: in some of these grains a portion of the albumen was formed, but no trace of an embryo existed; but in others there was a considerable portion of albumen, and a perfect embryo formed.

At the time when the sound grains change their color, the fungi, being ripe, cease to multiply; they are all of a globular form, and nearly of equal size, viz. $\frac{1}{16}$ part of an inch in diameter. Fig. 8 is $\frac{1}{16}$ part of a square inch on the micrometer; it sustains sixteen full grown fungi of *uredo fetida*; and this square, being represented of the size of a square inch, English measure, is consequently magnified one hundred and sixty thousand times in superficies, and the sixteen fungi represented in that square are magnified in the same degree; showing that no less than two millions five hundred and sixty thousand individual fungi would be required to cover one square inch.

Fig. 9 represents a fungus not quite ripe, with its short pedicle; and fig. 10 a perfectly ripe one, both magnified one thousand times lineally, or one million times superficially. These figures are thus highly magnified, to show the reticular structure of these fungi, which forms the external membrane; and it appears that the internal substance consists of a cellular tissue.

Fig. 11 represents one of the fungi shedding its seeds, which is only observable when viewed under water. I could never yet see the seeds of these fungi in a dry state, for they then appear to be mixed with some mucous fluid, which causes them to adhere together in hard lumps.

That the seeds of the fungi of *uredo fetida* are the sole cause of that destructive disease in wheat, the *Pepper Brand*, I think I have fully ascertained by numerous experiments of inoculating even the finest and purest samples of seed-wheat; and if that fact be admitted, it becomes evident that the prevention of it can only be effected by cleansing the seed-wheat so effectually, that every particle of the fungi and their seeds be entirely removed from the grains. But as these extremely minute fungi, when once mixed with the seed-wheat, insinuate themselves into the grooves at the backs and the beards at the tops of the wheat-grains, I think it almost impossible to dislodge them by the mere process of washing. I once received

some samples which had been so prepared, and washed in salt water, and declared to be perfectly clean; but on my putting some of these purified grains into water, in a watch-glass, and leaving them to soak about twelve hours, on then bringing them under the microscope I found many of the fungi floating on the water. This fact convinces me that mere cleansing is no secure preventive of this disease; and that the most efficacious, and perhaps the only remedy for preventing it, is that of depriving the seeds of the fungi of their vitality. To effect this, innumerable remedies have been recommended, and I believe applied by the farmers, but have seldom proved entirely successful. From my own often repeated experiments, though on a limited scale, I am convinced that the best and surest remedy is to steep the seed-wheat in properly prepared lime-water, leaving it to soak at least twelve hours, and then to dry it well in the air before sowing it; but I fear that it will be found very difficult, if not impossible, even by this method, to kill the seeds of the fungi entirely, when the quantity of seed-corn is great; and consequently some infected plants might still be found in large fields.

Steeping and properly drying the seed-corn in the above manner, not only prevents the disease arising from the infected seed-corn, but does also effectually prevent the clean seed from being infected by the seed of the fungi, which might exist in the soil of a field on which diseased wheat had been growing before; and consequently the cleanest samples of seed-wheat should be steeped, as well as the most notoriously infected.

These facts I have ascertained by repeated experiments of strongly inoculating with the fungi seed-corn which before had been properly steeped and dried, and the result has always proved satisfactory, for the infection never took place.

Wheat is the only plant that is liable to be affected by the Pepper Brand, which is occasioned by the *uredo fatida*. The Smut, or Dust Brand, is also occasioned by an *uredo*, but of a decidedly different species.

Kew, February 21, 1833.

F. B.

THE SMUT, OR DUST BRAND.

From the same.

This disease, like the *Smut Balls* or *Pepper Brand*, is occasioned by a very minute parasitic fungus, of the genus *uredo*, which Persoon (in his *Synopsis Methodica Fungorum*) notices as *uredo segetum*. It is, however, of a decidedly different species from *uredo fatida*, which occasions the *Smut Balls* or *Pepper Brand*, illustrated in my former paper.

The *uredo segetum* is distinguished from *uredo fatida*, not being much more than one-half the size and by being perfectly scentless; whilst *uredo fatida* is characterized by an extremely offensive smell. The manner in which *uredo segetum* acts upon the plants which it attacks is also very different, and the effect much more destructive than that of *uredo fatida*, which only attacks the grains in which it vegetates, but seldom bursts; whereas the *uredo segetum* not only generally destroys the whole ear, but even the leaves and stem. Further, *uredo segetum* attacks not only barley, but wheat and oats; and I have been informed that

other species of *gramineæ* are subject to its attacks, but I have not yet found any such specimens.

I have ascertained, by repeated experiments of inoculation, that the seed of the fungi of *uredo segetum*, like that of *uredo fatida*, is absorbed by the roots of the germinating seed-corn and, being so extremely minute, is mixed with and propelled by the circulating sap, and deposited in almost every part, even in the cellular tissue of the plant where these seeds continue to vegetate and multiply rapidly, as well as in every part of the plant where there remains the least vitality. The whole ear is often found entirely destroyed many weeks before even the individual florets are quite developed, or the sound ears emerge from the sheath. Sometimes, but rarely, the infection takes place after the parts of fructification have been formed, and even after fecundation has taken place; in that case the progress of the disease can easily be observed. The germen is generally the first attacked, and found partially, or half filled with the fungi then the pistils, the stigmas, the anthers; and even the extremely tender filaments appear full of black spots which are occasioned by small clusters of these fungi, which vegetate and multiply so rapidly that in a few days the whole ear is completely filled.

In oat-plants such late infection occurs more frequently than in barley or wheat, and the whole panicle often emerges from its sheath, to all appearance in a perfectly sound state, or perhaps with only a few infected spickets at its base, but the infection soon spreads visibly through the whole panicle and over every part of the plant; and even when such a partially infected ear is separated from the growing plant, the vegetation and multiplying of the fungi continue as long as any moisture remains in that portion of the plant which has been so separated. I once collected and cut off several such partially infected ears, which I intended to preserve as specimens, and for that purpose I laid them in brown paper to dry them: they were accidentally mislaid, and did not come into my hands again till after a period of six or seven months; when, on examination, I found that the whole specimens were consumed by the fungi. I have not the least doubt that the seeds of the fungi are shaken out by the wind; and that even many infected ears and plants are thrown on the soil of a field where such diseased plants have been growing, and that the fungi continue growing and multiplying on the soil, like those on the paper, until they become part of the soil, from which they cannot be distinguished.

I fear it will prove very difficult to find an efficient remedy to prevent, or even to check this destructive disease; and this fear seems strengthened by the consideration of the numerous remedies suggested by many eminent authors, as well in this country as on the continent. That the remedies of these authors should have failed in producing the desired effects is not surprising to me, for I find that the most eminent of them not only confound two or three distinct diseases, but are totally unacquainted with the real cause of any of the diseases: for some consider them caused by insects; some attribute them to blasts of the wind; others consider the disease to be a corruption of the sap of the plant. These, and many other causes, equally erroneous, have been advanced; but I hope that, if it be admitted that the seeds of the parasitical

fungi are the real and only cause of this disease, it will naturally occur to every one, that if the vitality of the seeds of these parasites could effectually be destroyed, the disease would be prevented. That the steeping in lime-water destroys the vitality, I have proved by many experiments; and also that lime-water has the same effect upon the seeds of the *uredo segetum*, as it has upon those of *uredo foetida*.

I fear that much difficulty will present itself to the steeping the seed-corn effectively, from the structure of the seed of barley and oats, the kernels of which are so tightly enclosed in the husks, that the lime-water cannot so readily penetrate, and reach the embryo, as in the naked seed-kernels of wheat and rye; but if some ingenious and unprejudiced practical agriculturist would make experiments on a large scale, by which every grain of the seed-corn could be effectually steeped in lime-water, I have no doubt but that the diseases of the *Smut* or *Dust Brand*, and the *Smut Balls* or *Pepper Brand*, would be effectually prevented, and perhaps, after repeating the experiments for a few successive years, these diseases might be entirely eradicated from the land.

F. B.

Kew, March 3, 1833.

THE GRAIN WORMS—*Vibrio Tritici*.

The existence of this most extraordinary disease in wheat has been, comparatively speaking, but a very short-time known; and it is only of a very recent date that it has attracted the notice of the practical agriculturists in this country. In July, 1807 I received, for the first time, some growing specimens of wheat-plants infected with this disease, from Kent, where it was said that the disease had existed some years, and, from its spreading, had attracted the notice of the farmers. They distinguish it by the odd names of *Ear-Cockles*, or *Brown Purples*, on account of the distorted shapes and dark-brown color of the diseased wheat-grains, which bear some resemblance to a weed generally growing in corn-fields, and vulgarly called *Corn-Cockles*, or *Purples*, the *Agrostema Githago* Linnæus. In Hampshire the disease is called *Burnt corn*.

From continued supplies of fresh specimens from Kent, I have been enabled to ascertain many important facts respecting the nature and properties of the minute animals engendering this disease. These experiments and results were so far satisfactory as to establish incontestably the fact, that the white fibrous substances within the cavities of the distorted grains consist of real organized animals, endowed with the extraordinary property of having their power of motion suspended for a considerable length of time, and of having it again restored by the mere application of water. But how are these animals introduced into the cavities of the young germens? And how are they propagated? These were questions which I could not at first answer, and I considered that these facts could only be ascertained by tracing the worms from the sowing of the seed-corn through the whole progress of the vegetation of the plant.

Being fully convinced that the worms or their eggs, like the seed of the fungi of the pepper-brand and dust-brand, must be absorbed by the germinating seed-corn, and propelled by the circulating

sap into the young germens, and reflecting that I had successfully inoculated the wheat-grains with the fungi, I determined to try the same experiment with these worms; accordingly I selected a sufficient number of sound wheat-grains, and extracting a small portion of the worms from the cavities of the infected grains, (which had been previously soaked in water about an hour,) and placing some in the grooves on the posterior sides of the sound grains, I left them for some days to get dry, and planted them in the ground on the 7th of October, 1807. At the same time I planted some sound wheat-grains in separate holes, about two inches deep, and in each hole two or three infected grains also. About the middle of November most of the seeds had come up, and from time to time I took some of these young plants for examination, but did not perceive any effect of the inoculation till the 3rd of December, when, out of nine plants, five proved to be infected with live worms. In the first plant, after carefully splitting the young plant from the root upwards, I found in the then unorganized substances, between the radicle and the plumula, three young worms very lively, but not much larger than those with which the seed-corn was inoculated; in another plant I found one full-sized worm, but no eggs about it; in the third plant I found a still larger worm than the last, but in dividing the stem I had cut the worm in two, and it soon died; it seemed to be full of eggs: in the other two plants I found some worms quite young, and some half grown; but on the other four plants the inoculation had no effect. The fact that, at such an early stage of the vegetation of these inoculated seed grains, such large worms were found, confirms my first supposition, that it requires several generations of these worms to introduce their eggs into the young germens; the large worms found in the substance of the young stem were undoubtedly some of the original worms with which the seed-corn was inoculated, for they were on the point of laying their eggs in that stage, and these eggs, being again propelled by the rising sap a stage further, then come to maturity, and again lay their eggs, and thus progressively reach the elementary substance of the ear, where they are finally deposited in the then forming germens; the whole progress probably requiring three or four such reproductions.

(Mr. Bauer then describes many subsequent examinations of infected plants, referring to the representations and descriptions given. A detailed account of the nature and properties of these worms was laid before the Royal Society, read on the 5th of December, 1822, and published in the "Philosophical Transactions" of 1823, under the title of "Microscopical Observations on the Suspension of the Muscular Motions of the *Vibrio Tritici*.")

My experiments, for resuscitating the grain-worms, I have repeated almost every succeeding year to this day, and always with the same success; but I find that the longer the specimens are kept dry, the grains require to lay in water a greater length of time before the worms will recover; and that, at every repetition of an experiment, a smaller number of worms recover their motion, and that after the same specimens (the produce of the grains inoculated in 1807) had been kept dry six years and one month, the worms were all really dead; this period is the longest which I have as

yet ascertained that these worms can retain their reviviscent quality.

That this disease is contagious, is sufficiently proved by the fact, that it can at pleasure be successfully inoculated on the soundest seed-corn. The infection, however, is not so generally nor so readily communicated as the diseases occasioned by the fungi of the smut-balls or dust-brand, a few infected ears of which are capable of contaminating and infecting the whole contents of a barn. Grains infected with these worms having no embryos, cannot vegetate and produce again diseased grains themselves, but can only communicate the infection by coming in contact with the germinating seed-corn in the soil, by the moisture of which the worms are revived and extricate themselves, which I have so often observed they do when kept some time in water.

Steeping the seed-corn in lime-water, in the same manner as advised for preventing the diseases occasioned by the fungi, is the most efficacious method of preventing the spreading of this disease. I have repeated the experiment by inoculating, very strongly, sound wheat-grains with the worms, and afterwards steeping them in lime-water, and the infection was always prevented; I have also steeped some sound wheat-grains in lime-water, and after having kept them in a dry state for some days, I inoculated them strongly with the worms, but on examining the plants, not one instance of infection occurred. From these facts it is evident, that properly steeping the seed-corn in lime-water before sowing, is a sure preventive of the disease occasioned by grain-worms.

F. B.

MANURE FROM HOGS.

From the Northern Farmer.

One of the regular means which every farmer possesses, for the increasing of his stock of manure, and which is by no means the least valuable; is by many totally neglected. It is that of making their hogs serviceable in this business. Upon this point, I can speak from past experience, both in respect to the loss from neglect and the advantages derived from these valuable animals, when employed for this purpose. It was my practice, till within the last fifteen years, to permit my swine to roam at large in the highway, in the summer season; or what was but little better, confine them in a pasture, for three or four months during the warmest of the season; carrying whatever I might have to give them as feed, to the place in which they were confined. I began, however, after a while, to consider this course of turning hogs to pasture, or permitting them to run in the highway, to be altogether wrong. Upon mature reflection, I concluded that by confining them in a close yard, and furnishing them with the materials for making manure, the profits would be amply sufficient, not only to repay me for all the trouble of furnishing the materials, but would also enable me to give them better keeping; and, in this respect, my anticipations have been fully realized. One error, however, I committed in the outset, and I have noticed the same fault in others. It was this: my yard was at first made at least three times too large, embracing about two and a half rods of ground, for three or four hogs, the number which

I generally keep; and I have seen yards including a much larger space made by some farmers, for an equal number of hogs. Now this, where the object is the making and saving manure, is, in my judgement, wrong; for, in so large a space, the quantity of materials put into the yard must be very great, or it must lie very thin over the yard; in either case, the benefit received from three or four hogs is but small; at least I found it so, where the materials, of whatever nature they might be, were put in one season and carried out the spring following. I therefore diminished my yard to twenty feet by fourteen, about one-third of its original dimensions; and I find this space to be sufficiently large for four hogs; and, I believe, large enough for even six to make manure to advantage; for in this space, materials sufficient for twenty or twenty-five loads of manure may be deposited in the course of one season; and what to me seems of the first importance in this business, is the hogs are kept continually on the materials, except when in their house, for the purpose of eating and sleeping.

My method of supplying these materials is the following: after having cleared their yard at the season of planting, I put into it such portions of straw as I may have left on hand after the season of foddering is past; and if I have not a sufficient quantity of this, to furnish the necessary supply till vegetable substances attain to a sufficient growth to be profitably collected, I put in earth collected from the low places, by the side of the highway; though this I more generally place in or near my barnyard, in a situation to receive and retain the wash that might otherwise escape from that. Brakes and weeds of any kind are valuable. These I make use of to the extent they are obtainable, when in a green state; as I consider green vegetable substances, for this purpose, far more valuable than dry. Potato tops when pulled for early use, before they become dry and shrivelled, I consider equal if not superior to any other green substances for this purpose. Pea-vines I usually put into my hog yard, after the peas are thrashed off; and if some are put in before being thrashed, they are as gratefully received by the inmates of the yard. Buck-wheat straw I have made use of, but I deem this to be of all substances the least valuable for the purpose of making manure, when it has ripened into a dry state, however valuable it may be when ploughed under in a green state, as it unquestionably is; being at that stage of its growth one of the most juicy plants of the vegetable kingdom.

I add nothing by way of materials to my hog yard, after the first of September, at which time I generally commence feeding, for the purpose of fattening; and by the middle or twentieth of December, my usual time for killing my hogs, I make from four to five loads of manure to each hog so kept, superior to the summer dung, obtained by yarding my cows. And the quantity made by my hogs is for each one double to that made by each cow for the same period of time.

Thus I have endeavored to present to the readers of the Farmer my method of adding to my stock of manure by the aid of my hogs from fifteen to twenty loads annually: whereas, I used formerly, as too many do at the present day, who call themselves farmers, entirely to neglect all these advantages, the improvement of which is so es-

essential to profitable farming. It is to be hoped, however, that no farmer, who has the opportunity of reading an agricultural paper, is so remiss in relation to that which is so conducive to his best interests.

MATTHEW BUELL, JR.

Newport, May 31st, 1834.

PETITION FOR A CHANGE OF THE LAW OF ENCLOSURES.

[We recommend the subject of the following petition to all who have not already considered it maturely—and to those who are satisfied of the unjust and oppressive operation of the law of enclosures, that they will forthwith proceed to act, for the removal of the grievance. Let similar petitions (either in this or any other form that may be preferred,) be prepared and properly presented to the consideration of the agricultural community, and there can be but small ground for fear as to the result.]

To the Editor of the Farmers' Register.

Essex, Aug. 9th, 1834.

I now send you an article which I hope will be in time for your next paper. It is a petition about to be circulated in this county, and I hope in many others, for changing the law relative to enclosures. No "internal improvement,"—always excepting that in regard to the general education of the people, which is first and above all others in importance—is so much wanted; nor any, I believe, to the great utility of which, if once carried into effect, converts would more rapidly be made. The people in the counties bordering on, and comprehending our mountains, may not yet, perhaps, have so generally felt the evils of this law, as to wish for its repeal; and if that be the case it might be suffered, in regard to them, to remain as it is: although I greatly mistake the condition of that part of our State between the head of navigation and the north western limit of our highly improved valley country, if the people would not be nearly, or quite as much benefited as ourselves by the change. I would be among the last men in Virginia to advocate any alteration of dubious policy, in a general law; or that did not, in fact, promise most manifestly to benefit a very large majority of our fellow citizens. But in this case there seems to me not a shadow of doubt on any point involved in the proposal, it being one which requires only to be made, to gain numerous supporters. That it may meet not only your approbation, but that of all your subscribers, is the earnest wish of

Yours, with much esteem,

JAMES M. GARNETT.

TO THE LEGISLATURE OF VIRGINIA.

The Petition of sundry citizens of Essex, respectfully sheweth—

That having become thoroughly convinced of the daily increasing necessity for some change in our laws relative to enclosures, we have at last determined to apply to you, as our only hope, for some remedy of the existing evil. That this determination may not appear to have been made either hastily, or from considerations merely selfish, your Petitioners beg leave to state the chief rea-

sons which have induced them to adopt their present course.

In the first place, the law of which we complain is a palpable violation of all other laws relative to property, which principle is, to compel every one "so to use his own, as not to injure that which belongs to another." But the law of enclosures actually permits us to injure others by means of our stock, unless they make a fence of a certain height to guard against those very injuries which justice demands that the perpetrators should be prohibited from committing under any circumstances. Instead of compelling stock-owners themselves to restrain their stock from depredating upon other people's lands, which the above cited principle clearly enjoins, the land owners are forced to protect both it and its products, at an enormous expense of extra fencing—or, to suffer without the smallest compensation, all the losses they may incur from the want of this extra fencing.

In the second place, we complain of this law, as the very unnecessary cause of more quarrels—more ill-will—and more lasting animosities between individuals and often whole families, than any other law in our whole code: indeed, we believe it may be truly said, of more than all the others put together.

Lastly, it imposes upon every land owner and cultivator a far heavier tax than all his other taxes united; and what makes the matter much worse is, that not a cent of it goes into the public treasury; but is utterly wasted and lost, inasmuch as it consists in the extra labor which each has to bestow on his own enclosures to protect their products from other people's stock. This legal oppression is greatly aggravated by the fact, that the small land owner—the small cultivator—in other words, the poor farmer, suffers much more in proportion to his property than the rich one; for having to fence it in, and daily to watch it, so as to guard against every other person's stock, and being in general, not so well provided, as richer land owners, with a proportionate quantity of labor, more of his precious time must generally be spent in making such enclosures as this most unjust and oppressive law prescribes, to say nothing of the time lost in repairing and supervising the whole. We may venture to say that this time, upon an average, amounts to two months in every year, and that it certainly could be abridged one month or more, thereby saving at least one-twelfth, or more, of the whole labor bestowed throughout the State, in the single business of fencing, if the law on this subject were exactly the reverse of what it is. Compel each person so to take care of his own stock as to prevent their injuring his neighbors' property, and not a cultivator of land in our whole community, whether he be proprietor or mere tenant, but would be thoroughly convinced in less than a year, of the immense advantages of the change. Indeed, we know no reflecting persons any where, with whom we have conversed on this subject, who do not admit the truth of the foregoing arguments.

Your Petitioners beg leave further to represent, that the circumstances of the country when this law was passed, having entirely changed, the law itself cannot now be justified, if it ever could be, even on the score of policy. We have no longer (at least in the tide-water part of our State) extensive tracts of uncultivated, unenclosed lands

deemed of little or no immediate value to the proprietor: fencing materials are becoming comparatively very scarce, and thereby the actual expense of labor in collecting and applying them has been enormously enhanced, while the products of our impoverished fields can very illy sustain this most unnecessary deduction from their net proceeds: add to this, the opinion is daily gaining ground, that even uncultivated lands will much improve by excluding every kind of stock from them. All these circumstances combined, render legislative interference imperatively necessary; for the evils enumerated admit of no other remedy. They have prevailed so long indeed, as to give rise to notions in some parts of our country, relative to landed rights, which, if general in regard to other rights, would reduce us nearly to a state of nature. These notions make all land, not actually cultivated in some crop, a species of common property, free for all who choose to turn their stock on; and this too, whether they be under enclosure or not. Now, if our lands be really our property, it follows as a necessary consequence, that each land owner has an indisputable right to the exclusive possession as well as use of it, and a just claim to protection therein by the laws of his country. This is a universally admitted fact as to every other species of property—why not then, in regard to land also? When we rest our horses to avoid wearing them out; when we lay aside our clothes for the same purpose, he who takes and uses either without our knowledge or consent, may not only be prosecuted and punished by law for such act, but incurs the risk of being utterly disgraced by it. Yet, when we rest our lands to avoid wearing them out, and in hopes of improving them thereby, which we have an equally clear right to do, free from all interruption by others, we are compelled by the existing law of our State to keep an enclosure round them of a certain height, or any other person's stock may depredate upon them the whole year round, even if in cultivation, without our being able to obtain the slightest compensation whatever for such depredation: nay, if any injury be done to the trespassing animals, their owner may recover damages from the cultivator of the land, although the land itself, and every thing growing on it, in the language of the law, is styled, as if in mockery, "his property."

These, may it please your honorable body, are crying evils,—of legislative creation too! and for whose benefit, we would respectfully inquire? For none whatever, but that very small portion of our community who may attempt to raise stock without sufficient means of their own to support them. This attempt the present law sanctions as fully as if it conferred the privilege in direct and express terms: sanctions too, without the least cost whatever to the stock-owners, while it compels all the planters and farmers throughout the State, annually to increase their labor—at the smallest computation, *one-twelfth*, if they would guard themselves against injuries which this law of the land empowers others to inflict on them with entire impunity. We venture to affirm that the code of no civilized nation on earth can show an instance of so very small and doubtful a benefit accorded by legislative enactment to the few, at so great and certain expense to the many. Indeed, we think it susceptible of the most satisfactory proof, that much more stock, and of far better quality would

be raised than at present, if the law were changed, as we pray that it may be. Such would be the sure result of applying *that labor* which each cultivator would save from fencing out other people's stock, to making more food for his own, and taking better care of them. He would have at least *one-twelfth* more time to devote to the profitable employment of improving and cultivating his land, instead of spending that *twelfth*, as he now does, in the *unprofitable* occupation of extra fencing. Though last, not least, the peace, comfort, and harmony of every neighborhood would be incalculably increased by removing forever, this most copious, most pernicious source of contention and animosity. Make it, therefore, we intreat your honorable Body, no longer to depend upon the height of each man's fence whether his neighbors' stock shall be raised upon his lands or not; but let it rest, as it always should do, upon his own free choice, how far he himself will extend the privilege to others. It would often be granted, and would thus prove a bond of union, instead of being what it now is, a brand of continual discord.

All which is respectfully submitted.

ON THE PREVAILING HABITS AND OPINIONS WHICH OBSTRUCT AGRICULTURAL IMPROVEMENT.

To the Editor of the Farmers' Register.

"Am I therefore become your enemy because I tell you the truth?"

Among the various interesting and valuable productions which have appeared in your widely circulating work, I have not seen a solitary one that treats of the fundamental causes which have affected the fertility of our land; and the very many avocations which have been, directly or indirectly, instrumental in preventing, more or less, the regular and systematic course necessary to the improvement of our farms.

Where once stood the majestic oak, the tall hickory, the lofty poplar, and the expanded dogwood, with its beautiful foliage in the opening spring, can now be only seen, in many sections of our State, a wide and extensive view of barren farms with scarcely timber enough to enclose them with fences sufficiently good to keep out the wandering and half-fed stock, which ever are pests to badly regulated farms.

Why this silence on this all important subject? Has false pride prevented the investigation of the causes? Or is it the fear of displeasing some few individuals of different professions that such valuable information is withheld?

Impressed with the fullest belief in the justness of my cause, and under the most anxious solicitude for the restoration of the fertility of our once beautiful and luxuriant fields, I propose to point out some of the most prominent causes of the poverty of our land; also some of the very many impediments to its improvement, and what, in my opinion, is indispensably necessary for us to pursue to improve our land, to increase our products, and to place us in such situation as to lend instead of borrowing money. In the discharge of this duty, I declare positively, that I disclaim all personalities; I am laboring for the improvement of the soil of my native State; for the prosperity of agriculture; for a change in our habits of life; for the adoption of a different manner in many cases of raising our

children, educating and settling them in life. But when I come to reflect upon the many *impediments* to agricultural improvements, also to a judicious system of cultivating the soil and the proper arrangement and distribution of labor, adapted to the increase of products, and at the same time to the improvement of our land, I am almost disposed to abandon the undertaking as hopeless and unavailing. However, if I can only suggest one profitable idea upon which others can improve, I shall be fully compensated for my time this hot summer's day.

The time has already come which imperious necessity demands, when the owners of Virginia land, the *Eastern in particular*, should pause—seriously reflect—and minutely examine into the situation of their farms. All the books on farming that ever have been written, all that are now writing, or may hereafter be written, can never avail much, unless there be a complete *fundamental* change in masters of land. Their habits must be entirely *revolutionized*. We must not become masters of our land in every acceptance of the duties of farming only, but we must change the acquired nature and disposition of our children. Early rising and habits of industry must be instilled in them. Let them know that they are not boys when they are really prattling children—that they are not men when they are actually only youths just entered into their teens, and in some instances not more than one dozen years old. Familiarize them to the grunting of hogs, the bleating of sheep, the lowing of cows, and the neighing of horses, that they may not be alarmed at these sounds when they become men. In fact, make more of them farmers and planters.

In the early opening of our land, our forefathers hastily cleared only enough to give them two, and sometimes only one shift, or for one year's working for corn. This was annually kept in cultivation until it became exhausted. Those who had been more industrious and had observed the greater steadiness, industry, and economy, became more prosperous, and consequently more wealthy than those of their neighbors who had pursued a different course. This enabled them to buy from the African trader a "nigger" or two (as Maj. Jack Downing would say.) This filled them with pride, and placed them in their own estimation, above their less fortunate neighbor.

The next thing introduced to the serious and almost inseparable injury of their land, was an individual called by name an overseer. I do not wish to be understood as going to say any thing against the intrinsic worth of these men, or their respectability and usefulness as members of society. Far from it. They certainly constitute a large portion of the "bone and sinew of our country." In peace they are watchful sentinels of our rights, and in war they are ready and willing to march in defence of their country's cause. They make brave and resolute soldiers. The masters, or as I would say, the potentates of their negroes and overseers, looked over with a commanding eye the ideal immensity of their wealth, and the superiority of their own greatness. They commanded their overseers to take their negroes and to cut down and slay annually the very best of their land, regardless of locality and consequences, and to make great crops. While they had such land, they made good crops, and they prospered.

Having given up the whole management of their farms and plantations, together with the negroes and every kind of stock, then to amuse their fancy, to improve their understanding, and to show their ideal greatness, they indulged in almost every species of luxury, extravagance, and dissipation. Having entrusted the management of their cropping department, their stock, &c. to overseers, it is but reasonable to suppose that no economy would be used to improve the soil, or increase and improve the stock. Their idle, lazy, and dissipated habits were caught by their children like an electric spark, and even handed down to the *present generation*! I do say without the fear of contradiction, that negroes and overseers are the *proximate* cause of the poverty of our lands, presenting to the weary traveller in many places, an almost interminable view of deserted farms and worn-out fields. If we only would take the management into our *own hands*, and *personally* devote the most of our attention to the duties of our farms, what a radical change for the better should we not very soon see. In every instance where proprietors cannot devote the necessary attention to farming and to the improvement of their farms themselves, they should employ superintendents, men who will discharge their duty *faithfully*, and for their compensation they should receive salaries in standing wages, instead of part of the crop, which is so commonly given. By adopting this as a general rule, I have no doubt but a considerable change would very soon be discoverable for the better, in every thing relative to the improvement of farms, and in the increase of products. By the adoption of this course peace and friendship will be established between employers and superintendents upon a more firm and lasting basis. Ditches will be kept open; red gullies filled with improving materials; farm pens better attended to; stock of every description increased in valuation, without incurring the displeasure of superintendents. It is not reasonable at all to believe, that any superintendent of a farm can feel much, if any, interest in the above requisites, who receives only for his services part of the corn, tobacco, cotton, and wheat. In this section of the State, *tobacco is the hobby*. This must be made regardless of all neglect and injuries of any or of all other commodities. All who continue to make this article as they have heretofore done, by the neglect of the grain crop, may never expect to see their plantations improving, and their declining years soothed and comforted with plenty of cash. Then make your tobacco ground rich, plant fewer hills, and by so doing, you will be enabled to work it better, manage it with less labor, and surely it will be of better quality, and will command higher prices than if you have double the number of hills half cultivated, and badly managed. The extra labor can be advantageously bestowed on the grain crop, from which you may raise your own pork and your own horses, without depending upon other States for a supply. All this must be done before you can deserve the appellation of good managers and prosperous cultivators of the soil.

We should teach fewer of our sons the syren song of being made members of the three learned professions, (misapplied terms now-a-days I think) viz: law, medicine, and divinity. I wish to say nothing at all in disparagement of these professions, properly so called. They are deservedly

respectable, and cannot, and certainly should not be dispensed with: yet it has become alarming to see their annual increase. At our County Courts we can scarcely get to the clerk's table to have a deed recorded, or a will proven, for the multiplied number of lawyers standing around, occasionally making a five dollars motion.

Second in order stand the doctors. Their number has increased within the last fifteen years several hundred per centum; much more rapidly in proportion than the population of the United States. Many of the States are furnishing medical schools, with cheap facilities for the acquirement of this kind of knowledge. The last annual report from the different medical schools, proves most conclusively how much this branch of science is overdone. It seems those who practice the cheapest and wait the longest are the cleverest and most approved sons of old *Hippocrates*. I should perhaps be accused of unpardonable neglect, if I were not to take a passing notice, and add to the list of doctors another class of men calling themselves *Thomsonians*, together with the *poison curers* who are dabbling into the various and different diseases of the human system. These self-styled doctors can, and I understand do, buy their education for twenty dollars, and then be made *approved* practitioners from one night's reading by torch light. How cheap! What an invaluable discovery in modern literature! How soon impaired fortunes can be restored, if plenty of patients could be found!

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In conclusion, I shall say something of another class of men called merchants. These men are highly respectable, intelligent, and very useful members of society. Their avocation cannot be dispensed with any more than the three learned professions, and surely commands as much respect and attention as either of these professions. But they have become too numerous for all to make fortunes, unless the farmers and planters are seriously injured or ruined. I understand merchants are men who sell goods, wares, and merchandize. But how many who call themselves merchants do not deserve that name in the proper acceptation of the term. This class of men cause more injury to agriculture, and produce more poverty and wretchedness in society generally, than any people in existence. When times are good, as are commonly called, these men are seen erecting shops at the forks of almost every public road, selling by jugs, bottles, and half pint cruets the meanest whiskey and northern rum, together with a kind of drink, they improperly call wine, the composition of which is made of ingredients of the most unhealthy kind. These establishments soon attract the attention of their respective neighborhoods, and call together large groups of men from their daily labor to drink, frolic and carouse, to the serious injury of their farming interest, and to the ultimate ruin of themselves, their wives, and their children. This is not all: our negroes are corrupted and injured by visiting these establishments. The late law, I am pleased to find, has put a considerable check on the owners of these shops, although not effectually. Before the enactment of this law, many of our slaves had become so corrupted, that it was almost impossible to keep them in subjection. Sunday was the day set apart for

the blacks to meet at these grog shops and to have their parties, their games, their mirth and festivities; and really, I believe, if they could only have had as many days as the whites to visit these hot beds of corruption, they would have equalled, if not excelled the white gentry. In every neighborhood where these grog shops have been long established, poverty, wretchedness, and ignorance have been the almost inevitable consequences. They have indirectly produced more deaths, not to speak of misery and concomitant evils, than all diseases from other causes which afflict men of years. The great and good man Dr. Rush said, "every disease has its antidote. It is only necessary to discover and administer it;" and I do say it is my belief, that these establishments (grog shops) have their antidote in the steady, judicious and persevering encouragement of the Temperance Society. Members of that society, I would advise you to pursue with unabated industry and perseverance the cause which you have so benevolently and praiseworthy undertaken. Men must however, be persuaded, not forced into the propriety of your cause. Although thrice armed is he whose cause is just, yet much patience, much forbearance, much moderation, and no inconsiderable firmness, are necessary. By your good *examples* united with mildness of conduct, and persuasion of argument, I entertain no doubt but the time is not far distant when a really old toper will be almost as difficult to find, as it is difficult for us at present to agree one with another in the selection of the man to be our next president.

I could name many other avocations of men wherein there is too much opposition, even to the serious and almost ruinous effects of carrying on competitions, and to the neglect and abandonment of the cultivation of the soil. It will be admitted that every person who is attached to any profession more than that profession wants, not only proves injurious to the individuals engaged therein by creating a losing competition, but is actually taking so much talent, labor and wealth from the cultivation of the soil. The great *desideratum* then should be, to equalize the different and various professions, so as for all to prosper and obtain a comfortable support for ourselves, our wives, and our children.

Knowing so well the constituent principles of the human mind and its great aptitude to misconstrue and misrepresent from *interested motives*, I think it highly probable that some few, very few I can but think, of the different professions of which I have taken a cursory view, may take exceptions. I again repeat that I disclaim all personalities. I am laboring solely for the prosperity of agriculture.

P. W. HARPER.

Green Field, Nottoway, Aug. 12, 1834.

RAISING CREAM BY HEAT.

From the Maine Farmer.

I am inclined to think that a communication on the mode of raising cream by heat, for dairy purposes may be of service.

There are two important points gained in the making of butter with the cream prepared in this way, viz:—Economy of time, and an increased quantity of butter from the cream prepared in this way. Fewer pans are needed, and of course few-

er to buy and wash, while the time saved in churning is very remarkable.—I think from the experience that I have had from my own cows, there is a gain of about 25 per cent. of butter. The process is simple.—Pans of a proper size will hold about a pailful; those I have, are made of zinc, being more durable and not much more expensive. When the cows are milked, the milk is strained into the pan or pans and allowed to stand twelve hours. The pan is then placed upon an iron frame, over well burnt coals, where it must be carefully watched, and on the appearance of the first bubble, taken off the fire; and after standing twelve or fourteen hours, according to the weather, the cream may be taken off, and then if sufficient cream is collected, churned.

When the butter is formed, the butter-milk is drained off—cold water is put into the churn—worked well with the dasher—and renewed until it comes out clean. By this process the hand is but little used.

N. B. The surest way of discovering the first bubble is, when the cream is well risen, to open the cream or pass a pin through it in the middle of the pan, and the first bubble that appears there, will indicate the proper time to remove it from the fire.

Your obedient servant,

CHARLES VAUGHAN.

ON AN IMPORTANT RESULT OF AN EXPERIMENT IN THE CULTURE OF POTATOES.

By the REV. JAMES FARQUHARSON, of Alford.

From the Prize Essays and Transactions of the Highland Society of Scotland.

I am not aware of any experiment having been made, similar to the one I am now about to describe; and as the result of that has turned out to be important, in a practical view, it may not be unworthy of the notice of the Highland Society.

I had not the merit of devising it, for it was first made by my servant. In the year 1824, at the time of hoeing the potato crop, I observed thirty or forty plants, in part of one drill, so greatly superior to any other in the field, that I became desirous of knowing the cause, and on inquiry of my servant, he gave me the following account. At the time of planting, the potatoes cut for plants had become exhausted, before the prepared ground was all planted, and he had carried some whole potatoes to be cut by the planters in the field. Observing among these several potatoes of large size, he had, with his own hands, planted thirty or forty of these uncut and together in one drill, which he had marked, to see whether the produce would be large potatoes. They received no additional manure, and were planted, in all respects under equal circumstances, and at equal distances with the other plants in the field.

I observed that these plants maintained a great superiority in all stages of their growth, and obviously attained a state of full ripeness before any others. At the time of digging them, in autumn, their produce was carefully attended to, and found to be in a remarkable degree superior in the weight of crop and largeness and uniformity of the potatoes.

In the succeeding season I ordered the experiment to be renewed, on as large a scale as my field ad-

mitted of, and varied, by planting the greater part of the field with cuts of large sized potatoes, and some drills with uncut large ones, and others with small ones uncut and cut.

I regret that I did not keep any note of the weight of the crops raised after the several sizes, the experiment being intended at the time solely for my own information; but the increase in weight after the large potatoes, both cut and uncut, was exceeding great. I have since adopted the practice of planting cuts of large sized potatoes only; and can now state it as a proposition universally true, that the produce of large tubers is much more abundant, more uniform in size, and considerably earlier than that of small tubers, under equal circumstances of soil and planting.

It will be objected to the system of planting large potatoes, that if we gain a greater weight of produce, we have previously put a greater weight of plants into the ground. But the additional weight of the plants bears only a small proportion to the additional produce; had it been otherwise, I should not have deemed the experiment worth reporting. The fact is, that the additional produce, when large tubers are exclusively chosen for planting, may amount to two or three times the whole weight of the plants.

I have been enabled to turn the result of the above experiment to account, in extending to culture in the field, an early variety of the potato, which I got in 1826.

In that year I purchased for trial small quantities of several varieties of potatoes, recommended each for some particular quality, and announced for sale by a seedsman. I did not find any of these worthy of being continued in cultivation, excepting an early one, with which I got no name. It ripens about a month before the white kidney, has a very good flavor for the table, and preserves its good qualities after being pitted through the winter, a thing not common in early varieties. Its imperfections, when I first got it, were, that the tubers were small, and weight of crop inferior, which, although not making it objectionable as an early garden potato for the table, unfitted it for field culture for the cattle.

As in this country (upper district of Aberdeenshire) our common field varieties of the potato are liable to have their tops smitten by incidental hoar-frosts in the months of August and September, before they are fully ripened, and thus to be much deteriorated in quality, and often rendered deficient in quantity, it occurred to me, that it might be an object worth attaining, to increase the size and produce of this early potato, by the means indicated by the above experiments; when, if this could be done, we should have a good keeping potato adapted for field culture, and ripening early enough to escape the frost.

By a careful selection of only the largest tubers for plants, for a succession of years, this object has now been satisfactorily accomplished; and for the last two years the half of my field potatoes, raised for the cattle and poultry, has been of this variety, and has given a weight of produce, ripening very early, scarcely, if at all, inferior to that of any other variety formerly in cultivation in this neighborhood.

Alford, September 26th, 1838.

REPORT OF THE RESULT OF EXPERIMENTS ON FEEDING TEN HORNED CATTLE, AND AN EQUAL NUMBER OF HOGS, ON RAW AND ON PREPARED FOOD.

By JOHN BOSWELL, Esq. of Balmuto and Kingcausie
From the Prize Essays and Transactions of the Highland Society
of Scotland.

(Subject continued from No. 4, Farmers' Register.)

The reporter conceiving the knowledge founded upon the result of an accurately conducted experiment as to the comparative profit of raw or prepared food, to be a matter of much importance to the farmer, determined on setting about the investigation of the subject with all the care and zeal in his power; and accordingly, on the 15th October 1832, selected ten cattle, which were inspected by Mr. Blackie and Mr. Walker at Kingcausie on the following day. They were all dun, horned, and not only of the same breed, but perfectly alike, and almost all got by the same bull,—the weight of the lot to be put on raw being 183 stones 11 lbs. Dutch, the lot to be fed on prepared 179 st. 10 lbs. Dutch.

The food, it may here be mentioned once for all, was from first to last yellow bullock turnip, without any leaves or roots, and round red or pink potato commonly called Perthshire reds. The cattle being all exceedingly tame and quiet, took to the raw food at once, but those which were put on the steamed food hardly tasted it for several days, so that by the 18th they had a very jaded appearance; nothing, however, was given to them but fresh steamed food, the stalls being carefully cleaned every twelve hours, and the stale stuff given to the pigs. A few of them took to it, and in a short time they all seemed to relish the prepared as well as the raw, although it was a fortnight before they looked so full and well as the cattle fed on raw food. The feeder (who had the charge of both lots) was directed to put the raw turnips and potatoes into the stalls at the same time, when the potatoes were regularly finished before one turnip was tasted. On the other hand, the lot on prepared food picked out the steamed turnips in preference to the potatoes.

As the reporter is aware that minuteness will be expected, he may here state that the turnips and potatoes for the prepared lot having been weighed, were very slightly washed, and the turnips were thrown into the hopper of a slicer, and cut into pieces about half an inch thick, after which they were put into the receiver of a steaming apparatus, such as is described by Mr. Spears in the Quarterly Journal. The potatoes, also when washed, were thrown into another receiver. When the steam was fully up, so as to lift the safety valve, the cocks were turned, and in fifteen or eighteen minutes they were ready to be thrown into one large tub to cool, previous to being carried to the cattle. During the time the turnips and potatoes are subjected to the action of the steam, large quantities of water are partly given off and partly condensed, owing to the low temperature of the raw food, so that the receiver would soon get (in sailor's phrase) "water logged," if the attendant did not every few minutes pull out the plug, and empty the space which is between the false and real bottom of the receiver. This water, or rather liquor, from the turnip receiver, has a most agreeable sweet smell and taste, and this the feeder drew off regularly during the whole course of

the experiment, and threw into the food tub. That which flowed from the potatoes, although it had no unpleasant taste or smell, being rather sweet, yet as there exists a strong prejudice against potato liquor, was suffered to run off into the grating. The winter was now advancing, the cattle improving steadily and well, and both lots keeping nearly alike, the only difference being, that the lot on raw consumed much more food than those on steamed. As to fodder, the straw during the first month, and the hay for the remainder of the time, appeared to be the same. The reporter says appeared, because, although the quantity given to each was weighed, and that was the same, yet every one knows that the fodder is pulled about by the cattle and a portion always lost, but no difference could be observed. Twice a-week, on fixed days, both lots got a small quantity of the tops of common heath, which acted in the way of preventing any scouring; in fact, turnip cattle seem very fond of heather as a condiment, and there never was any purging amongst the cattle under this experiment. The dung of the steamed lot was from first to last in the best state, without the least appearance of purging, and was free from that abominable smell which is observed when cattle are fed on raw potatoes, or even when a portion of their food consists of that article. Another fact was observed, that after the steamed lot had taken to the field, they had their allowance finished sooner than the raw lot, and were therefore sooner enabled to lie down and ruminate. The accompanying papers show that the food to both lots was proportioned to what the cattle would eat; and the statement of Deacon Williamson certifies that the two lots were exactly alike both in weight and quality after they were slaughtered.

The reporter has now to state what took place with regard to pigs. Being anxious that there should be no interference as to food or any other circumstances, he preferred conducting this experiment apart from the other, and therefore, on the 1st December 1832, caused his overseer at Balmuto to put up ten pigs, all of one litter, in two lots, which, by a little management, he succeeded in getting exactly of the same weight, the lot to be put on raw food being 5 cwt. 2 qrs. 22 lbs., the lot to be put on prepared food also 5 cwt. 2 qrs. 22 lbs. The food employed was round red potatoes and the best oat meal. Those on raw food had the oatmeal given them in the shape of "crowdy," i. e. the oatmeal mixed up with a little cold water. The lot on prepared food had the potatoes boiled and the oatmeal made into common water porridge. From the very first it was clear that the lot on the prepared food were fast beating the others, and an increased quantity of oatmeal was given to the lot on raw, in order to make them ready for sale along with the others; yet still, as may be seen by the documents herewith given in, they were greatly deficient on the 1st March, at which time the experiment being concluded, they were put on prepared food, when they began instantly to make up the "lee-way."

In conclusion, the reporter has to make the following observation:—It appears that it is not worth the trouble and expense of preparation, to feed cattle on boiled or steamed food, as, although there is a saving in food, it is counterbalanced by the cost of fuel and labor, and could only be gone

into profitably, where food is very high in price, and coal very low. It must, however, be remarked, that the winter 1832-33 was a remarkably mild one; on the contrary, had it been very frosty and cold there can be no doubt the cattle on raw food (with every care) would have fallen back; and lastly, that there cannot be a doubt that in the feeding of swine prepared food is the best.

[By the accompanying certified statement, it appears that, of the cattle, Lot 1, fed on raw food, the weight was 183 st. 11 lbs. Dutch, while that of Lot 2, fed on steam food, was 179 st. 10 lbs.; but the weight after the experiment is not mentioned, it being only stated in general terms, by Mr. James Williamson, who purchased the cattle, that, on killing them, he "took particular notice of the quality of the beef and weight of tallow in each lot, and found them, to the best of his judgment, to be perfectly alike."

The cost of keeping the five cattle on raw food amounted to £32 2 1, while that of the cattle on prepared food was £34 5 10, there being a balance of £2 3 9 in favor of the raw food.

With respect to the pigs, it appears that the five put on boiled food weighed at the commencement of the experiment on the 1st December 5 cwt. 2 qrs. 22 lbs., and at its termination on the 1st March 10 cwt. 1 qr. 1 lb.; while the five fed on raw food weighed at these different periods 5 cwt. 2 qrs. 22 lbs., and 8 cwt. 1 qr. 15 lbs., leaving a very decided difference in favor of those fed on prepared food. The expense in the case of the latter was £6 19 4, and in that of the pigs fed on raw food £5 8 6, so that the profit was after all inconsiderable.]

REPORT OF EXPERIMENT OF FEEDING PIGS ON RAW AND STEAMED FOOD.

By Mr. ROBERT WALKER, Ferrygate, Haddington.
From the Prize Essays and Transactions of the Highland Society of Scotland.

We put up to feed, on the 4th March 1833, five pigs on steamed potatoes, and five on raw potatoes, with an allowance of 2½ lbs. of broken barley each lot, the barley, for the steamed lot, being steamed along with the potatoes. They were allowed the same quantity of potatoes, but, from the circumstance of their being, when put up, only 2½ months old, and from the same brood, we were not able to keep so accurate an account of the quantity of potatoes consumed; because as they increased in size, they ate more potatoes.

The following Table will exhibit the improvement in pounds weight.

	Weight in lbs.
1833	
March 4. Live weight of five pigs, on raw food, - - -	106
Ditto of 5 ditto, steamed food, - - -	106
Difference in favor of raw food, - - -	2
19. Live weight of five pigs, on steamed food, - - -	114
Ditto of five ditto, on raw food, - - -	111
Difference in favor of steamed food, - - -	3
30. Live weight of five pigs, on steamed food, - - -	137
Ditto of five ditto, on raw food, - - -	123½
Difference in favor of steamed food, - - -	13½

May 1. Live weight of five pigs, on steamed food, - - -	205
Ditto of five ditto, on raw food, - - -	176
Difference in favor of steamed food, - - -	30
June 1. Live weight of five pigs, on steamed food, - - -	279
Ditto of five ditto, on raw food, - - -	223

Total difference in favor of steamed food, 56

In the three months, the pigs on steamed food have increased 173 lbs., being 67 lbs. more than double; while those on raw food have only increased 115 lbs., being 7 lbs. more than double their first weight, so that there can be very little doubt that steamed food is more profitable for feeding pigs than raw food. In fact, the reporter does not think it possible to make pigs fat on raw potatoes, without other food, when confined to them alone.

ON THE IMPORTANCE OF LIQUID MANURE IN HORTICULTURE, AND THE PECULIAR ADVANTAGES OF SOOT AS AN INGREDIENT FOR THAT PURPOSE.

By Mr. JOHN ROBERTSON, F. H. S. Nurseryman, Kilkenny.

From the Gardener's Magazine.

Amongst the many advantages which horticulture has derived from Mr. Knight's enlightened application of science to its practice, we may reckon as not the least important, his earnest and repeated recommendation of liquid manures. In general, liquid manures have not had that importance attached to them by gardeners which they merit. They may at all times be resorted to with advantage; but, in a number of instances, and particularly where immediate effects is required, no other manure can be so well applied. To enumerate their uses and preparation, however, would demand more consideration than I am enabled to bestow;—my present object being solely to point out a material for the purpose, which I have long availed myself of with success, though it seems to have been overlooked by most gardeners—it is soot.

Sir H. Davy characterizes soot as "a powerful manure, possessing ammoniacal salt, empyreumatic oil, and charcoal, which is capable of being rendered soluble by the action of oxygen, or pure vital air;" all which component parts rank high as nutritious or stimulant manures. On meadows I have used soot with great advantage in substance, and though sown by the hand, one dressing gave me always heavy crops of hay for two successive seasons; but this is a wasteful mode of applying it, a great proportion of its ammonia, one of its most active ingredients, being volatilized and dissipated in the atmosphere. When dissolved in water there is no waste:—it is all available, and for horticultural purposes I have mostly used it in that state, mixing it up in the proportion of about six quarts of soot to a hogshead of water. Asparagus, peas, and a variety of other vegetables, I have manured with it with as much effect as if I had used solid dung; but to plants in pots, particularly pines, I have found it admirably well adapted: when watered with it, they assume a deep healthy green, and grow strong and luxuriant.

ant.—I generally use it and clean water alternately, and always overhead in summer; but except for the purpose of cleaning, it might be used constantly with advantage; and though I cannot speak from my own experience, never having had either scale or bug on my pines, (pine apples) yet I think it highly probable, as the ammonia it contains is known to be destructive to these insects in a state of gas or vapor, that in a liquid state, it does not totally destroy them, yet that it will in a great degree check their progress.

Other materials for liquid manures are often difficult to procure, and tedious in their preparation: but soot, sufficient for the gardener's purposes, is almost every where at hand, and in a few minutes prepared.

Were gardeners more generally aware that no manures can be taken up in a state of solidity by plants as food, and that they can only be absorbed by them in a gaseous or liquid state, to which all solid manures applied must be previously reduced, before any benefit can be derived from them, they would in many cases facilitate the process by using them in a liquid state. In houses (green and hot houses) where the rains have not access, it appears to me superior to any other mode of administering manures to trees.

Kilkenny, Aug. 24, 1826.

Quere.—Has any system been adopted for collecting at one or more deposits the soot of this and other large cities? Might it not be easily done through the superintendents of chimney sweepers?

ON PROVIDING SCHOOLS FOR THE INSTRUCTION OF FARMERS' SONS IN THE PHYSICAL SCIENCES.

By MR. WILLIAM HAWKINS, Hitchen, Hertfordshire

From the [British] Quarterly Journal of Agriculture.

It is the object of this paper to recommend the establishment of schools throughout the kingdom, for teaching farmers' sons the elements of the sciences; such, for example, as Chemistry, Vegetable Physiology, and Mechanics. And, in the progress of it, I shall endeavor to show, first, the usefulness of such knowledge, and then the method by which it may be generally diffused; and I think I can make out both these points to the satisfaction of any body who will take the trouble of attending.

To prove the importance of agriculture to a community, seems very like demonstrating the advantage of having food to eat and clothes to wear. That it is indeed "the first and greatest concern of every nation, and the foundation of its prosperity in every other matter," is a truth so universally acknowledged, that it has obtained almost the currency of a proverb. But in spite of this general recognition of its supremacy, a due proportion of human ingenuity has never been directed towards the investigation of its principles. The mechanical arts have been carried to a high degree of perfection, and the genius of the mechanic has been employed in every branch of the arts, and in every

look in vain for the institutions which should diffuse among practical farmers even that knowledge which already exists. The principles of agriculture may have been explored by the genius of Davy, and its practice reformed by the labors of Young, but discoveries and experiments can be useful only as far as they are known. Mr. Tennant has shown how the farmers in the neighborhood of Doncaster might have told that there was magnesia amongst their lime-stone, and that consequently it would be injurious to the soil; that is to say, he knew these things himself, but of what use were his experiments to the Doncaster farmers, who never heard of them, nor perhaps of him either? It is said that vaccination was known in a district in Gloucestershire before the time of Jenner, but how did that avail those who were dying of the smallpox in London? The barrenness of the hills in Westmoreland will be remedied, when, not the chemists and the vegetable physiologists of London or Paris, but the tenants and occupiers of those very hills shall understand its causes and its cure. At present the means of diffusing scientific knowledge amongst them are extremely limited, and the general establishment of agricultural schools would have for its object the conveyance of knowledge to the place where it is wanted, in a manner perfectly analogous to the ingenious contrivances by which water is conveyed from the reservoir at Islington to the houses of the inhabitants of London.

But, it may be asked, shall chemists and reclusive philosophers presume to teach farmers how to farm? Is it not to be supposed, that men who have passed their whole lives in that pursuit, understand it better than any body else? Most unquestionably they do. Sir Humphrey Davy would, most likely, have made a bad farmer. There are a thousand important considerations connected with farming, of which he was probably ignorant; but still he ascertained, in a manner clearer than had been done before, the principles which regulate the application of quicklime as a manure. And it does so happen, that many of our useful discoveries have been owing to men not connected in practice with the art to which their discoveries were applicable. Arkwright was a barber, Dollond was a silk-weaver. The compass, the chronometer, and the weather-glass, three of the greatest helps to navigation, were all discovered by landsmen. Gunpowder is supposed to have been first found out by a monk.*

Put into another shape, the possibility of progressive improvement in agriculture may be a little more palatable. The farmers in France obtain from a soil at least as fertile as ours, no more than 18 bushels of wheat per acre on an average. Is this because they have less experience or less skill and knowledge than ourselves? And if one of us should undertake the thankless task of pointing out to them their errors, he might count upon being laughed at for his pains,—for presuming to know better how to farm their lands than they who had been at it for generations.

Amongst the many helps towards a more perfect knowledge of external nature which the mind

...and please your heads so much about gunpowder, said my uncle Toby, 'his Providence will get out of every thing.'

of man has discovered in these latter days, the first place is due, by general consent, to

Chemistry.—The efforts of the farmer are chiefly directed towards making land more fertile; and the first step in this process is to inquire in what particulars less fertile land may differ from that which is more so; to compare the two together; to find out the ingredients of each, and the proportions in which they are mixed. The knowledge how to do this is Chemistry. Arguments upon particular cases are commonly more intelligible than abstract reasoning; and it may therefore be advisable to select an instance. The following is from Sir Humphrey Davy's *Agricultural Chemistry*.

He says, "a soil of good apparent texture from Lincolnshire was put into my hands by Sir Joseph Banks, as remarkable for sterility. On examining it, I found that it contained sulphate of iron, and I offered the obvious remedy of top-dressing with lime, which converts the sulphate into a manure."

Now, what is the process by which, as we may suppose, Sir Humphrey Davy arrived at the knowledge that the difference between this barren soil and other soils of the same appearance, consisted in its containing sulphate of iron. By previous instruction, he had made himself acquainted with the nature of soils in general, and with their most usual ingredients, and he proceeded to test for them, one after another, until he threw in the reagent, which forced the latent mischief to show itself.

For the sake of perspicuity, let us suppose that of the many substances in nature, which may not improbably exist in a soil (and the presence of either of which would lessen its fertility,) the four following are supposed to be the most probable.

1. An alkali.
2. An acid.
3. Magnesia.
4. Sulphate of iron.

Any vegetable blue, such as the infusion of violets, would be a test for the first two substances. The infusion would turn green if an alkali, and red if an acid, were present. The presence of magnesia would be indicated by its slightly effervescing when plunged into an acid, and by its rendering diluted nitric acid milky. If, by these applications, it should be decided that neither of the first three ingredients existed in the soil, the next point would be to inquire as to the presence of sulphate of iron. It might be difficult, it might perhaps be impossible, for the eye or the hand to perceive it; but, if it existed, a few drops of the infusion of galls, poured into a wine-glass containing a small portion of the earth dissolved in water, would cause the mixture to turn as black as ink, and it would in fact be ink; for sulphate of iron and galls are the materials of which ink is commonly made. And all this is very easily done; it might be performed by a child. All that is required is, that a few ounces of the soil should be brought home, and, at each experiment, a teaspoonful of it put into a wine-glass, and a table spoonful of the test-liquid poured upon it.

By means as simple as these, a man may tell what ingredients go to the composition of any soil that he may wish to examine, but it requires a little more trouble to ascertain the proportions in which these ingredients exist; and the barrenness of a soil may be owing to the excess or deficiency

of an ingredient not less than to its absence or presence. A chemical analysis of soils, however easy to those who have been regularly taught how to conduct it, could scarcely be performed by those who had not; and few men can be brought to give these things sufficient attention after their school days are over; for which reason it is particularly desirable to have them taught in youth,—“in the morning of our days, when the senses are unworn and tender, and the gloss of novelty is fresh on all the objects which surround us.”

“The instruments required for the analysis of soils are few, and but little expensive. They are, a balance capable of containing about a quarter of a pound of common soil, and capable of turning, when loaded, with a grain; a set of weights from a quarter of a pound troy to a grain; a wire-sieve, sufficiently coarse to admit a mustard-seed through its apertures; an argand-lamp and stand; some glass bottles; Hessian crucibles; porcelain or queen's ware; evaporating basins; a Wedgwood pestle and mortar; some filters, made of half a sheet of blotting paper, folded so as to contain a pint of liquid, and greased at the edges; a bone knife, and an apparatus for collecting and measuring æriform fluids.”—*Agricultural Chemistry*, 146.

And a farmer need not possess all these things himself. If the proposed schools were established in every district, the apparatus, with the necessary reagents, would be kept at each school, and might be used occasionally by any body: and all he wants for most purposes would be a few acid and vegetable infusions,—a test-box, in short,—with the weights, sieves, lamps, and earthenware used for domestic purposes. And many very important results might be come at by these simple methods.

What can be easier to observe, whether an infusion of any kind turns vegetable blues red or not? But if it does, the infusion contains an acid, and therefore lime, or any alkaline substance, is a good dressing for it.

When a piece of paper moistened with muriatic acid, and held over the steam arising from a dunghil, gives out dense fumes, it is a certain proof that the decomposition is going too far, for it indicates that volatile alkali is disengaged.

It requires very little labor to observe, whether a soil effervesces by the action of an acid, or whether it burns when heated, or what weight is lost by heat; and yet these simple indications may convey most valuable information concerning the ingredients of the soil.

If the whole case rested upon these instances, there would be little room to fear refutation, for they surely prove the applicability of Chemistry to Agriculture—they prove that many of the causes of sterility, and consequently the appropriate remedies, may be discovered by its aid.

Not that all these instances would be applicable to all soils, but some would apply to one species and some to another, and happy would he be whose land was so good that he could find no fault in it. And it may be repeated over and over again, in favor of chemical analysis, that all barrenness, as well as every other quality of a soil, must of necessity be owing either to the presence or absence—the excess or deficiency—of some element.

Entomology.—*The Knowledge of Insects.*—The first step in proof of the utility of this science, might be to show that insects do a great deal of

harm; but I shall probably be allowed to take that for granted. The destruction of the turnip-crop alone is a very serious national evil. Slugs, grubs, and wire-worms eat the seed in the ground, and other creeping things in the granary. Flies torment the domestic animals whilst alive, and blow their flesh when dead. Caterpillars eat cabbages, and moths riddle holes in cloth. Almost every plant has its insect enemy. Clover-seed is destroyed by a small weevil (*Apion flavi-femoratum*;) Dutch-clover by the *Apion flavipes*; peas in the pod by the small beetle (*Bruchus granarius*.) The wire-worm is the grub of the beetle (*Elatér Segetis*.) The turnip-fly is properly a beetle—a little jumping beetle (*Haltica nemorum*.)

The problem of course is how to destroy this legion of enemies. Now, to do this with the greatest effect, we must watch them through all their changes. There may probably be many persons ignorant that most insects pass through four stages of existence, (of which the silk-worm affords a familiar instance;)—1st. The egg—2dly. The caterpillar—3dly. The chrysalis—and, 4thly. The butterfly or imago. It is in the second stage that insects generally do the most mischief. In the egg and the chrysalis they do none; and in the imago, some do and some do not. Though we are all familiar with the insect in the shape in which its ravages compel our attention, we are frequently unconscious of its identity under other shapes. Though our last year's crop was destroyed by the wire-worm, we should probably pass by a swarm of the parent beetle, the *Elatér Segetis*, without being aware of the relationship; and in the same manner we look on the cockchafer, without suspecting that its issue is the grub which eats the roots of the grass. But however desirable a knowledge of entomology may be, no single individual could acquire it all for himself. He would need the eyes of Argus—the patience of Job—and the years of Methuselah. The diligence and sagacity of men who have passed their lives in this study have at length accumulated a body of facts of the highest value; being printed, they have become the property of every body who will take the trouble to read them; and thus a school-boy may learn in a few months facts which the labors of his whole life might have been vainly exerted in seeking.

Messrs Kirby and Spence are the great authorities upon this subject, and from their book most of the facts here stated have been taken. They themselves suggest a similar application to practice of the truths of their favorite science. "With respect to noxious caterpillars in general," say they, "farmers and gardeners are not usually aware that the best mode of preventing their attacks is to destroy the female fly before she has laid her eggs; to do which, the moth proceeding from each must be first ascertained; but if their research were carried still further, so as to enable them to distinguish the pupa, and discover its haunts (and it would not be difficult to detect that of the greatest pest of our gardens, the cabbage butterfly) the work might be still more effectually accomplished."

The follies committed for want of a little knowledge of entomology, are well illustrated by another passage of the same authors. "In Germany, the gardeners and country people with great industry gather whole basketsful of the destructive

cabbage-moth (*Noctua Brassicæ*.) and then bury them—which is just as if they should endeavor to kill a crab by covering it with water—for many of them being full grown, and ready to pass into their next state, which they do under ground, instead of destroying them by this manœuvre, their appearing again the following year in greater numbers is actually facilitated. Yet this plan, applied to our common cabbage-caterpillar, which does not go under ground, would succeed."

The process of destroying noxious insects by attacking them in their early stages is not new in this country. P. Musgrave collected the chrysalids in the spring, so as to become acquainted with them, and then employed people to catch and kill the moths and butterflies. If you catch 200 in a day, you destroy 10,000 eggs, which would give 120,000 in a fortnight.—Might not boys and girls be well employed in doing this? They have all the organ of Destructiveness.

In short, it is abundantly evident, that if we knew them in all their changes, and know where they are concealed in autumn, winter, and spring, we might exterminate those multitudes which are now as the sands which are upon the sea-shore. And if not all the knowledge required be yet in our possession, a great deal is, and might be easily imparted to the young farmer, if we could catch him in his chrysalis state; and what little is still wanting would soon be accumulated when we had set so many keen and interested eyes to observe: a fly could scarcely move but they would be watching him.

The Diseases of Cattle.—This is an important subject. There is no individual of many years' experience in farming, who has not suffered severe losses from the death of horses, cows, or sheep. Diseases amongst sheep are perhaps the most common and the most extensive, and to whom is the cure of them entrusted? Generally to a laboring man, who has not the remotest knowledge of the several organs which compose the animal frame, or of their functions, and whose education has not fitted him to reason correctly even upon the few facts which he knows. What should we think of entrusting our friends or relations in sickness to a man who had studied no more of anatomy or medicine than a shepherd? And the mischief is not confined to their ignorance of the true remedy. Ignorant men are the most irreclaimable theorists. They attribute disorders to the most fanciful cause, and then from their assumed and absurd premises, they argue away to a conclusion as hardly as a geometrician. I have heard many striking instances of this from a friend of mine, who is himself both a physician and a philosopher. One poor patient laid the blame of his sufferings upon a cause which few would have thought of. "Sir," says he, "*it is the wind meeting the digester*;" and no doubt his remedy would have been to have put some covering round the digester, to keep the wind away. Another poor fellow was troubled with "*a rising of the lights*;" and being asked whether he had taken any thing for it, "Yes," he said, "*he had swallowed some shot to keep them down*." And I beg to assure the incredulous, that this is an extremely common disease and remedy in this neighborhood; and these are the very men who prescribe for our sheep! Formerly it was the custom to ascribe diseases to the direct operation of the devil, and of course the

cure was correlative to the assigned cause. "Touching the heart and the liver, if a devil or an evil spirit trouble any, we must make a smoke thereof before the man or the woman, and the party shall be no more vexed, and the devil shall smell it and flee away, and never come again any more." And the story goes on to say, that in Tobit's case, the evil spirit fled, when he had smelt it, into the utmost parts of Egypt; but I do not suppose that this kind of fumigation would answer now-a-days. But, *revenons à nos moutons*, or rather let us proceed to the horses, with which, indeed, the case is not much better. If you send for a farrier, the message not unfrequently is, that he cannot come to see the horse to night, but that he has sent him a drink, and will come and see him in the morning. Now, try this system by the same test: how would you like it yourself? You are suddenly attacked with a violent complaint, and you send for Sir H. Halford. He never saw you perhaps in his life, and knows nothing whatever about what is the matter with you; but he sends his compliments, and desires you to take a dose of Daffy's Elixir; and if your complaint be what is very common with horses, viz. inflammation of some of the viscera, this dose will probably finish you, as out of all doubt it has finished many an unfortunate quadruped. Not that the absence of the farrier signifies much; he probably does not know a bit the less of the disease on that account. The study of horse-medicine and surgery has no doubt made much greater progress than that of cows or sheep, and some of its professors are men of sense and education, as I am personally able to testify; but how few are they compared to those of an opposite character. It was said, with much point and truth, by an old physician, that in all cases of illness there were three things to consider,—the patient, the disease, and the doctor; and that if any two of them pulled well together, they would be able to beat the third. In the case I have been supposing, it is the disease and the doctor against the patient.

Cows, again, stuff themselves with cabbage, or other succulent food, which by and by ferments and gives out a great deal of carbonic acid gas; the stomach becomes distended, and, if relief be not speedily afforded, the animal dies. Many a valuable creature has perished in this way, whose life might have been saved if the owner had been chemist enough to know what would stop the fermentation, or had been provided with mechanical instruments for drawing off the gas. And these attacks are sudden,—remedies to be useful must be near. There is no time to fetch the doctor, even supposing him to be worth fetching. The owner himself must know what to do, and how to do it. It is not proposed to make every farmer an accomplished surgeon; that would be impossible, but it is not impossible, and it would not be useless, to teach him at school something of the structure and diseases of the animals on whose health his fortune depends; something of the symptoms by which those diseases are indicated, and something of the operation of the most important medicines. Being so constantly slaughtered for domestic purposes, there would never be wanting opportunities of studying their organization. The national gain, by diffusion of this sort of knowledge, would be immense. According to Mr. Colquhoun's esti-

mate, there were in the United Kingdom, so long ago as 1812,

1,800,000 Horses.

10,000,000 Horned Cattle.

42,000,000 Sheep and Lambs.

There are no tables published of sickness and mortality amongst quadrupeds; but out of 53,000,000, the deaths occasioned by disease in the course of a year must amount to an enormous total. In Holland, above 500,000 cattle are known to have died of disease within 20 years. At £10 a piece, this would come to £250,000 a year. The tenth part of one year's loss upon this article of cows alone, would be enough to put into operation throughout the whole kingdom schools, which would create ten times as much wealth annually as was ever lost by the death of cows. If money laid out in diffusing knowledge produced a return of only one hundred-fold, it would be certainly an eligible investment; but a hundred-fold would be little, compared with its eventual products.

Mechanics—the art of producing a given result with the smallest expense of power.—It is very important to make power go as far as possible, because it is the dead weight upon a farm. Horses eat and drink, but produce neither milk nor wool. Perhaps the best way to show the value of this kind of knowledge, is to point out the losses attendant on its absence. Every body must have seen ploughs so ill constructed as to require three horses to draw them through a soil which might have been worked well enough with two in a plough of the improved pattern. Instead of a sharp edge contrived to cut the ground, and a well formed mould-board to turn it over, you may sometimes see a blunt wedge dragged slowly through the soil, to the intolerable fatigue of the cattle, as well as the rapid destruction of the plough and the harness; but little work is done, and that little in an expensive and slovenly manner.* Carts and wagons, too, are susceptible of great improvement; their more common faults are their weight—the friction at the axle, the dishing of the wheels, and the want of springs: the consequence is, that a horse is jaded and knocked up by what would, under more skilful management, have been an easy day's journey. An acquaintance with mechanics would also induce a man to pay more attention to the state of the roads. But besides carts and ploughs, we are every day introducing fresh machinery. We thrash, dress, plant, and sow by its aid, and though of no very intricate construction, these machines are somewhat more so than the old farming implements. The farmer is not to expect his laborers to study

* By the way, it appears to me that an improvement might be made upon the best ploughs now in use. The cutting of the soil appears to be scientifically done; but the clod, when cut, presses with force against the shoulders of the mould-board, and offers considerable resistance to its advance. Evidently the force which turns it over should, if possible, be made to act at right angles with the track of the plough, whereas at present it approaches to the same line. Might not an endless chain, or a horizontal wheel of small diameter, be inserted just at the point where the clod presses upon the mould-board, so as to ease the friction? If the pulverization of the clod be the object, that would be more economically effected by rolling and harrowing afterwards.

their principles, and he is not up to his work unless he can tell whether his tools are well or ill made, and can see the cause of any defect in their workings. If, by a little here and there a man can save the labor of one horse on a farm, it is a great thing. The multitudes of machines which are rising like meteors round us, should, in this branch of science, at all events, unteach us the foolish vanity of supposing our present practices to be the best possible. In the West Indies they are no doubt as well convinced of the excellence of their agriculture as we are, and they have not generally introduced either the plough or the wheel-barrow! My authority for this is the writer of a lively sketch of their manners and customs, entitled "Marly, or a Planter's Life in the West Indies." He says, "after a week or five days of this kind of labor, very distressing to the people, few acres indeed were gone over, although there were rather more than 100 negroes employed, one day with another, digging only these holes in the ground. *Had the ground been previously tilled with the plough*, an amazingly greater quantity of these holes could have been made in one day than it was possible for the people to effect in three or four in the manner in which they worked."—"To carry the manure to the required spot was the task of the negroes, and the weak negroes, who, with some little help at the manure-heaps, had to fill their baskets and then carry them on their heads at a pretty smart pace, and empty them into the holes. This employment of bearing the manure none of the carriers at all relished, but the stimulus of the whip, and the daily encouragement of a dram of rum, effected wonders. *Had the people been furnished with wheel-barrow*s, they could have performed their tasks with ease."

It need not be inferred from this, that I suppose our practice to be as faulty as theirs. It is adduced for no other purpose than to rouse people from the lethargic dream in which we are all too apt to indulge, that the established practice is the *ne plus ultra* of perfection.

Accounts.—In a business embracing so many particulars as farming, it is essential to be able to distinguish the profit and loss upon each. Nothing is more easy or more common than for a man who keeps no accounts, to continue for a series of years to lose money upon some particular department without knowing it, or, which is almost as bad, to employ his time and capital in less profitable speculation, when he might have applied them to such as were more so. A farmer grows many sorts of crop, and keeps several species of animals—breeding some and buying others, and uses many kinds of manure. Assuming that he has a general profit of 10 per cent. at the year's end, how is he to tell whether all the branches of his business have contributed rateably to this result—how, I say, is he to tell this without accounts? The cost of one acre of corn, for example, is by no means self-evident; it is "compounded of many simples, extracted from many objects,"—rent, tithe, taxes, seed, and tillage—horses' keep and man's keep—rates for the poor, the church, and the highways—and so with every other crop. Suppose now, that, in the case of oats, all the items of expenditure accurately set down shall amount to £5 15s. an acre, and that the crop shall sell for £5 10s. Upon 40 acres here would be a loss of £10 a-year; but without setting down the several items which com-

pose the cost, and adding them together, how is a man to tell within 5s. what his acre of oats cost him? He may know that his acre cost him *about* £5 or £6, but in this very *about* lies the essence of the mischief. About £5 or £6; now if the selling price were £5 10s., the former supposition would give a profit, and the latter a loss, of £20 a-year; and thus any man may, and multitudes do, continue to the end of their lives carrying on branches of business by which they lose money unconsciously. The same observations apply to manures brought on the farm. Price, carriage, labor, &c. all reckoned, bone-dust may be 5s. an acre dearer or cheaper than stable-dung—but without counting up the cost of each item that forms the price, a man may be ignorant of this difference, and so may lose 5s. an acre. It is by a few shillings gained here and saved there, that a farmer makes his profit. It is no exaggerated estimate to suppose that these petty items may often make a difference of 10 per cent. at the year's end, and that so, one man may make a living on the same farm where another would fail. A knowledge of these details, therefore, is useful, and is to be acquired by a system of accounts. Nearly allied to, if not identical with, accounts, is a facility at all the common operations of arithmetic, and the storing in the mind of certain arithmetical results, which may serve as the basis of future calculations. The multiplication table is a familiar example of the vast importance of this prepared and portable knowledge. The commonest operations of arithmetic could scarcely be carried on without the intuitive readiness with which the produce of any two of the numbers under twelve have been made to occur to the mind; but the principle is capable of an application much wider than it has received. The proportions existing between the numerical parts into which the year, the acre, the pound sterling, and the ton weight are divided, might be impressed on the mind, and, as it were, *burnt in* by continual repetition; as, for example, the weight of an acre of turnips is a fact which it is desirable to know, and which is ascertained in five minutes, if we bear in mind that, for every pound on the square yard, there are 2 tons 3 cwt. 14 lbs. on the acre; and we should in a similar manner be able to tell without effort, what breadth of turnips would keep a sheep or a cow for a year. The number of inches in a square or cubic yard, and of yards in an acre, the number of pounds in a ton, and the proportion existing between the days in the year and the common subdivisions of our measures of weight, capacity, superficies, and value, suggest themselves as instances. A number of these facts and relations being well impressed on the recollection of boys at school, they would come in after life to the calculations necessary to establish knowledge instead of guesses respecting the affairs of their farms, so well prepared as to make that occur intuitively and without labor, which men, not so prepared, could only come at with much labor, or perhaps not at all. There is scarcely any thing easier than the use of logarithms, but we are certainly not all qualified to have invented them.

There still remain other sciences from which instances as pregnant might be drawn. Vegetable Physiology, Meteorology, Geology, Hydrostatics; but it is not by the endless multiplication of instances that attention can be enchained or convic-

tion adduced, but a sample is intended and not a catalogue. A nosegay may give some idea of the riches of the parterre, and has the advantage of being more portable.

But besides enriching the mind with a store of knowledge positively and actively useful, a course of education such as I have suggested, would, by the inculcation of sound principles, defend the mind from the inroads of many senseless prejudices; for ignorant men are, as has been before hinted, the most inveterate theorists. They will never be satisfied without assigning some cause for the phenomena which they see, and that assigned cause is often not only false, but absurd; and, as the remedies resorted to are naturally correspondent with the supposed cause of a disease, the latter is likely to remain undisturbed, and a new disease to be introduced by the operation of the intended remedy. Apple trees have been cut down, from its having been unjustly supposed that they bred certain insects which did mischief to the corn. Kirby and Spence give an instance of a meadow in which the grass was eaten up by grubs; the rooks were busy in digging for these grubs, of which they happened to be fond, but the owner thought it was the rooks that eat the grass, and he therefore shot them. It is not stated whether he also killed his cat to preserve his cheese from the mice. Bradley, an agriculturist famous in his day, accounted for the blight in the following original manner:—He supposed it to be occasioned by insects which came from Nova Zembla, "*where the cold is intense enough to give life to these small creatures.*" The late Mr. Bakewell theorized himself into thinking, that dung should be dried into the fineness of a pinch of snuff,—"*an opinion,*" says the author of the new Farmers' Calendar, "*which I have ever thought absurd and unprofitable in the extreme,*" and I believe most people will think so too; but even the author of that Calendar is guilty of the following heresy:—He says, at page 158, "*it would be wonderful did we not know of the constant recurrence of such contraries in agricultural practice, that lime has been often found both of the utmost advantage and perfectly noxious by different cultivators, on soils of a perfectly similar nature,*" which I think "*may hardly be, Master Shallow.*"

A scientific education would, moreover, remove the great gulf which appears to separate every part of the country from every other part; things may be known and done for ages in one place, without their being heard of in another not a hundred miles off. Potatoes were brought into Ireland about 1610, and did not arrive in Cantire, which is a very sandy soil, and where they have since succeeded so well, in less than a century and a half. They had reached Lancashire forty years before they were much planted about London, and then considered as rarities, without any conception of the utility that might arise from bringing them into common use. The cultivation of the turnip was introduced about 1670, but at first it seems to have been overlooked and even neglected for many years, and then again proposed, recommended, and explained with better success.

To put the argument into a different form, let us advert to the introduction of Swedish turnips. Less than 35 years ago, the author of the new Farmers' Calendar was obliged to quote an account of them from the Nottinghamshire report,

"being without experience in the culture of this root." And in another place he says, "*I hear his Grace the Duke of Bedford has from 20 to 30 acres of the Ruta Baga at Woburn.*" Now, if this crop had made its way no faster than potatoes, it would not have been heard of over a quarter of the kingdom yet, and there are many farms to whose improved system of husbandry they are essential. It is stated in the History of the Royal Society, that the value of sea-shells as a manure had been known in Cornwall at least as early as 1675, and the process followed had been published in the Transactions of the Royal Society; and yet, in 1744, the use of them was so little understood in Suffolk, that a farmer who found it out by accident, soon realized a fortune by the discovery.

But of proofs and instances *jam satis*. Enough has been said to convince those who are willing to give a peaceable reception to truth,—and this paper is addressed to them only,—and to them I say that we have in this scheme a matter of high import to the nation at large. The universal complaint seems to be, that the people are growing too numerous for the land. No parish but either has, or fears to have, a redundant population;—men, able and willing to work, subsisting unprofitably and uncomfortably upon the poor rates,—this superfluity displaying its effect in diminishing the rate of wages; that, again, followed by distress, and distress by riot and insubordination, and the evil increasing so fast, that it was lately stated by the chairman at the Quarter-Sessions in one of the towns in the south of England, as the result of his calculation, that if things continued to go on for five and twenty years longer as they had done for the five and twenty years past, the poor rates would swallow up the whole rent of the land, so that it would not be worth a shilling to the proprietor. Now, though I do not "*go the whole hog*" with the noble chairman, I think it cannot be denied that there is something strange in the present position of the country,—in the increase of the people, rapid beyond all former example, and in the more rapid increase of the poor rates. It is an indisputable fact, that the money raised for the relief of the poor increased six-fold in the reign of George III, while the population only doubled; but over-population is relative, and not absolute. It is not to the superficies, but to the consumable produce, of the land that the people are disproportioned. If we can augment its fertility by one-tenth, we in effect add one-tenth to its measurement, and do as much good as if we could recover another Yorkshire from the German Ocean. Supposing the quantity of corn grown could be indefinitely increased, the number of people could never become inconvenient, even though it should increase ten-fold, but manifestly much the contrary. An hundred millions of people would bear with ease the burdens which crush us to the earth. If we can improve the cultivation so fast as to keep ahead of the population, we shall do good beyond the hopes of the sanguine, or the wishes of the benevolent; but if only so fast as to prevent the disproportion from getting greater, we shall intercept an incalculable mass of misery. Every class of society is interested in this question. The farmer in the first instance, then the laborer, who would find more employment, in proportion as the farmer had more profit of his labor,—the manufacturer would have cheaper food and more cus-

tomers,—the exporter would enlarge his commerce, and require more ships; but the chief, the greatest, the most lasting benefit would accrue to the land-owner. Instead of ten acres with poor rates, he would have, as it were, fifteen without. The country gentlemen are those on whom it is most incumbent to put this scheme into execution; and it could appeal to no fitter patrons. There never was a time in which there existed among them so much intelligence and public spirit as at this day; but hitherto those qualities have wanted direction and concert.

It has already been hinted, that the instruction here proposed could be given only at schools. Grown men scarcely ever have resolution enough to carry them through the fatigue of studying fresh sciences. Either distinct schools might be established, or the existing schools might be modified. An intelligent farmer, who is already in the habit of taking pupils, might be provided with a scientific tutor. In the morning, the boys might employ themselves, as they do now, in personally observing and assisting in the affairs of the farm; and in the evening they would receive from their tutor instruction in chemistry, botany, the structure and diseases of cattle, the knowledge of insects and of the weather, natural philosophy and book-keeping. I suppose a couple of years well employed would be sufficient to give a young man a competent knowledge of these matters. A difficulty might present itself in the first instance, in finding tutors properly qualified; but that would be at the beginning only, for the pupils of this year would be the tutors of the next, and so a perpetual succession would be provided. People are shy of new things; but a father in choosing a school for his son would naturally say, (if the charge was not increased,) whether these things be of any use or not, we shall get them for nothing; the boys will receive the usual instruction and this besides, be it worth little or much; and, therefore, by all means let us have it.

The only means by which there is any hope of accomplishing these purposes is, the formation of a comprehensive Agricultural Society; and it is a little surprising, that amongst the innumerable societies now existing in London, there is none specially dedicated to the improvement of agriculture. There are many provincial farming societies, probably all useful more or less; but there are important purposes which they are not qualified to effect. Therefore, I propose the formation of a central society, to be established in London, for the improvement of the agriculture of the kingdom, which might be called the "British Society of Agriculture," with the following objects:—

To provide a suitable building, or rooms, for holding a library, museum, &c.

To hold meetings once a fortnight, at certain seasons of the year.

To procure from the most eminent scientific men of the day, lectures on the application of the various sciences to agriculture, which might afterwards be printed.

To correspond with foreign societies, and to form a centre of communication for those established in this country.

To take in all the periodical and other scientific works applicable to agriculture, published in any part of the world, and to print and circulate, in a

cheap form, monthly digests of whatever useful matter they might contain.

But, principally, to establish throughout the kingdom schools for the instruction of farmers' sons in the elements of the Physical Sciences.

IMPROVED SYSTEM OF BEE MANAGEMENT.

From the Penny Magazine.

There is no branch of rural economy connected with more agreeable associations than that of bee management. The proverbially industrious habits of the insect, and its extreme ingenuity in the construction of its domicile, and the deposition of its treasures, are such as to excite the admiration of the most unobservant. The common necessity of destroying the stock, in order to obtain the produce of their labors, has been always matter of regret. Many plans have been hitherto devised for the purpose of obtaining the honey without the destruction of the bees, but they have only been attended with partial success. The object has, however, been latterly and more perfectly attained by Mr. Nutt, a practical apiarian of Lincolnshire, whose system of management has given this branch of rural economy an importance and value of which it was not before considered susceptible, both in the greater productiveness of the bees, and the much superior quality of the honey.

The first part of Mr. Nutt's plan of operation is to leave the hive, into which the stock is introduced, untouched. When it is filled with honey (the contents of which are to be reserved for the use of the bees,) the capacity of the hive is increased, by the addition of another box to the side, communicating with the hive by apertures, which give free admission to the bees in all parts of the box.

The next important object in Mr. Nutt's system is to ensure a regulated and uniform temperature in this portion of the hive, without diminishing the temperature of that which contains the stock. The ventilation necessary for this purpose is effected by the means of a perforated tin tube, extending down to a considerable distance from the top into the hive, and connected with an aperture at the bottom, which may be partly or wholly closed by a tin slide, thus modifying the circulation of the air and consequent degree of temperature. The temperature of this side box, which is indicated by a thermometer introduced into the tube, ought to be 70°, which is the natural temperature of the working hive; but, in that which contains the stock, a temperature of 90° is necessary, as well for the incubation of the queen bee, as the maturity of the young. The parent hive is, then, as well the residence of the queen bee as the nursery of the young, whilst the side boxes are but additional storehouses for the reception of the superfluous honey, which may be taken away without impoverishing the stock, or robbing them of their winter sustenance.

When the thermometer placed in the side box rapidly rises to 90° or 100°, the necessity of again providing the bees with fresh room is indicated; and this is effected by establishing another box on the opposite side of the hive. The bees, finding an increase of room, will readily recommence their labors in this new apartment.

Then follows, in Mr. Nutt's system, the operation of separating the bees from this second hive.

This is effected by the ventilator, by which the internal temperature of the hive may be reduced to that of the external atmosphere; and when, on the approach of night, the bees, recoiling from the cool air, go back into the middle box, the connexion between the two may be closed, and the full hive withdrawn, without the imprisonment or destruction of a single laborer. The same arrangements are to be again renewed, as the bees continue their successful labors. In this system no provision is made for swarming, which cannot occur under this arrangement, the emigration of a part of the stock being only occasioned by a want of room in which the bees may pursue their labors.

The honey furnished under this system of management is found to be far superior both in quality and quantity to that obtained under any other arrangement. The honey and wax are as white as refined sugar. This superiority in quality it owes as well to the modified temperature at which the bees secrete their products, as to its total exemption from all extraneous animal and vegetable matters, and, in particular, from the pollen or bread, which is taken in considerable quantities into the stock-hive for the support of the young. This superiority of the honey is only equalled by the quantity of the supply: the usual annual supply from one stock is about one hundred-weight of honey; whilst, in the course of one season, Mr. Nutt has procured the large quantity of 296 lbs. This increase in quantity is owing to the excellent disposition of the arrangements, by which the industrious efforts of the bees are never retarded, nor their strength weakened at the time when the fruits and flowers most abound from which their treasures are obtained.

AMHERST AGRICULTURAL SOCIETY.

For the Farmers' Register.

At a regular quarterly meeting of the Agricultural Society of Amherst County, Va. held at the court house of the said county, on Monday the 4th day of August, 1834.

A quorum for business appearing, but the President not being present, John J. Ambler, the first Vice President, took the Chair, and called the Society to order.

In consequence of the recent organization of the Society, the several Vice Presidents were excused for not making reports to this meeting of the state of agriculture and the growing crops in their respective hundreds, and John J. Ambler, the 1st Vice President, in lieu of such report, presented and asked the attention of the Society to a report of the committee of the Agricultural Society of Albemarle, on Farms, made to the Society at their Show and Fair the 1st October 1828, and on motion, Resolved, that the Secretary do procure to be printed for the use of the Society two hundred copies of the said report.

On motion, ordered that the Secretary procure a copy of Ruffin's Farmers' Register, commencing with the beginning of the work, and continuing with its publication in future, and that he cause the same to be bound in volumes, to be kept by him for the use of the Society.

The Society proceeded to fix the subjects and premiums to be awarded at their next meeting the first Monday in November next, whereupon it was agreed that the premiums following be offered to

the members who shall be the actual owners of the animals, the producers or manufacturers of the other articles, that is to say—

1. For the best thorough bred Stallion, over four years of age, - - - \$10
2. For the best thorough bred brood Mare, over four years of age, - - - 10
3. For the best Stallion, other than thorough bred over four years of age, - - - 5
4. For the best brood Mare, other than thorough bred over four years old, - - - 5
5. For the best thorough bred Colt, under two years old, - - - 5
6. For the best thorough bred Filly, under two years old, - - - 5
7. For the best Colt, other than thorough bred over two years old, - - - 5
8. For the best Filly, other than thorough bred under two years old, - - - 5
9. For the best Jack Ass, over four years old, 10
10. For the best Jinney, over two years old, 10
11. For the best Mule, over two years old, 5
12. For the best full blooded improved Durham short horned Bull, over three years old, - - - 10
13. For the best full blooded improved Durham short horned Cow, over three years old, - - - 5
14. For the best full blooded improved Durham short horned Bull, under two years old, - - - 5
15. For the best full blooded improved Durham short horned Cow, under two years old, - - - 5
16. For the best half blooded improved Durham short horned Bull, under two years old, - - - 5
17. For the best half blooded improved Durham short horned Cow, under two years old, - - - 5
18. For the best Bull, of any other breed over three years old, - - - 3
19. For the best Bull, of any other breed, two years old or under two years old, - - - 3
20. For the best milch Cow, of any other breed over three years old, - - - 3
21. For the best Cow, of any other breed two years or under two years old, - - - 3
22. For the best grass fed Bullock, - - - 10
23. For the best yoke of work Oxen, - - - 10
24. For the best Ram, of any breed, - - - 2
25. For the best Ewe, of any breed, - - - 2
26. For the best thorough bred Boar, of the Barnitz breed over two years old, - - - 5
27. For the best thorough bred Boar, of the Mackey breed over two years old, - - - 5
28. For the best thorough bred Sow, of the Barnitz breed over two years old, - - - 5
29. For the best do do of the Mackey breed do do, - - - 5
30. For the best Boar, of any other breed over two years old, - - - 5
31. For the best Sow, of any other breed over two years old, - - - 3
32. For the best Shoar, of any breed six months or under six months old, - - - 3
33. For the heaviest fattened Hog, of any breed 5
34. For the best two horse power hill-side plough, - - - 2
35. For the best three horse power plough, - - - 2
36. For the best acre of ploughing to be

- done before the Society at Amherst Court House, with a plough drawn by not less than two horses or one yoke of oxen, on the first day of the November meeting next, - - - \$20
37. For the best piece of five yards or over five yards of negro clothing of household manufacture, fabricated of wool and cotton, - - - 2.50
38. For the best piece of five yards or over five yards of negro clothing of household manufacture fabricated of cotton 2
38. For the best piece of five yards or over of Jeans, fabricated in like manner of wool and cotton, - - - 2.50
39. For the best piece of five yards or over of cotton Counterpane of like manufacture, - - - 2
40. For the best piece of five yards or over of cotton and wool Counterpane, of like manufacture, - - - 2.50
41. For the best piece of five yards or over of domestic Carpeting, of like manufacture, - - - 2.50
42. For the best specimen of any other household manufacture, wholly of cotton, wool or silk, or of any of them, 5

It is hereby declared by the Society that whenever the term thorough bred is used in their specifications, it shall be construed to mean that the animal has at least eight pure crosses of the particular breed.

The Society next proceeded to fix other subjects for premiums for the next year, the premiums and the regulations under which they shall be awarded, to be hereafter regulated, of which due notice will be given, that is to say:

1. For the best cultivated farm, not less than ———acres the property of a member.
2. For the second best do do do acres the same.
3. For the third best do do do acres the same.
4. To the overseer (if any) of the above farms over and above the premiums which may be awarded to the owner or employer.
5. For the greatest products of four contiguous acres of high land in wheat.
6. For the greatest products of four contiguous acres of high land in corn.
7. For the greatest product of four contiguous acres of high land in clover hay, the hay to be weighed at least one month after being cut, and the land to be measured in every instance by the chain, under regulations hereafter to be ordered by the board of agriculture.
8. For the greatest product of one acre of high or low land in timothy or other grass hay, to be weighed and measured as in the 7th specification.
9. To the grower of the hogshead of tobacco, which shall be sold for the highest price in open market for cash to the highest bidder in the town of Lynchburg.
10. For the overseer (if any) who shall superintend the cultivation and prizing of the same, over and above the premium to the owner.

Ordered that the contributions for membership

for the present year be paid to the treasurer on or before the 3d Monday of the present month.

On motion, *Resolved*, that the Editors of the Lynchburg Virginian and of the Farmers' Register be requested to publish these proceedings in their respective papers.

The Society then adjourned till the first Monday in November next.

JOHN J. AMBLER, President, pro tem.

Robert Tinsley, Secretary.

COLIC IN HORSES.

For the Farmers' Register.

It is a source of consolation to sensitive minds to reflect that the diseases of the brute creation are few and simple in their nature: but at the same time it is mortifying to know they are not considered sufficiently important to require the attention of men of science and ability. Too little attention is generally devoted to a proper acquaintance with these diseases, when their treatment properly belongs to every husbandman. If each farmer having a knowledge of an approved remedy for any disease were to communicate it, the information would become as extensive as the Register is circulated—nor would I consider it too heavy a tax upon its columns. These truths being impressed upon my mind, I am disposed to follow the humble manner of some of your correspondents, and give a recipe I have always found singularly efficacious for colic in horses.

The causes of this disease are numerous—bad food, hard rides, constipated bowels, sudden transitions from heat to cold and the reverse, bots, and even customary food when the system is previously weakened by fatigue and overaction. To cure the disease produced from any of the foregoing causes I generally administer an ounce of laudanum in a little water, which has invariably succeeded with me—but candor compels me to acknowledge my veterinary practice is not extensive: but I have used the above recipe successfully after the ineffectual administration of a variety of other remedies, which entitles it to farther trial.

Its mode of operation may be explained upon philosophical principles. The various causes of the disease generally destroy the equilibrium of circulation and excitability. The blood flows from the surface of the body towards the point of diseased or weakened action, and congestion ensues in some part of the alimentary canal. So long as this congestion exists, so long must nervous irritation and spasmodic action, and consequently the suffering of the animal continue. But restore this altered circulation and derangement, and ease follows; a healthy and natural condition of the system immediately supervenes. Now no remedy promises so far to fulfil these healthy indications as laudanum. It is a powerful anti-irritant and diffusible stimulant, as well as anti-spasmodic. The irritation being relieved by any remedy, the spasm relaxed, and a cure follows as surely as light drives away darkness. No danger need be apprehended from its early administration, but if fever and inflammation were to exist it would be certainly forbidden. This condition of the system requires bleeding, purging, and clystering—and frequently a use of cold water on the surface.

B. H.

Prince George.

For the Farmers' Register.

REVIEW.

An address to the Essex (Mass.) Agricultural Society delivered at their annual cattle show, September 26th, 1833: By Jeremiah Spofford. Published by order of the society. Salem, printed by Foote & Chisholm, 1834.

With the mechanical costume of this publication, as also with many things in it we have been much pleased. The address itself was delivered by a gentleman of one of the learned professions before the farmers of his county. This is as it ought to be. No professional gentleman descends to encourage agriculture by speech or example. It is also pleasant to see any gentleman speaking well of his native land, and expressing, even in strong terms, as our author does, his love of country. Nor are we less pleased at any well directed intelligent efforts to improve the solid wealth of any community, even if it were in China, much more when in our own beloved country. Let all men by all fair means endeavor to generate general contentment in the minds of their industrious neighbors. We are much pleased with some other things in Dr. Spofford's address. We think he has paid a just and becoming tribute to Christianity and its institutions, and has also done honor to his own head and heart, when he says, that his "memory still loves to 'hover o'er' those inestimable Sabbaths, when, after six days labor done, we found a day of rest, and assembled within these very walls, to enjoy it in social, solemn worship; nor can any one know the value of those Sabbaths, unless it be those who spend the week in patient labor, and assemble on the seventh as a sacred holiday, to greet the countenances of their friends, and pay their devotions to the most high God. Here then we met few except cultivators of the soil, prepared by their labors in the field to render their tribute of gratitude to Him who gives rain from heaven, and fruitful seasons, filling their hearts with food and gladness. Venerable fathers! who then bowed in this sacred temple! may your sons as patiently cultivate the soil you then possessed, and as devoutly worship here. You will forgive this digression, when you look around the world, and see how closely connected are christian morality and agricultural prosperity,—and you will as soon expect to gather grapes from thorns, or figs from thistles, as to find a well cultivated farm under the superintendence of him who neither fears God, nor regards man."—pp. 5, 6.

Nor are we less gratified with the sensible remarks on the importance of a total disuse of ardent spirits among all persons engaged in agriculture. On this subject there ought to be, and we are persuaded when the facts are well examined and weighed, that there will be but one judgement. The following sentences are very appropriate:—

"No portion of the community have paid a heavier tribute to the distillery than the farmers. Their laborious occupations and exposure to heat and cold, fostered the belief that ardent spirits were necessary to them. But this error is now nearly exploded, and I rejoice that the hour of their emancipation has arrived. Too long have you submitted to a tax ten times more burdensome than Great Britain ever attempted to impose, when it was resisted by a seven years' war. But what is worst of all is, that this tax is not like the tax on tea, merely collected and carried out of the country, but it returns in another form to curse the payer and make him an idiot and a slave. Here some will object, and say they still use spirits, and have neither spent their property, nor destroyed their intellects. I allow the truth of the assertion, some can bear the ex-

pense without serious embarrassment, and regulate their appetites so they are never drunken. But to such I would say, you incur a useless expense, and encourage by your example your neighbor, who can neither bear the expense, nor regulate his appetite. Let me entreat such to change their example to the other side of the question, and lend their aid in drying those tears of heart-rending anguish which flow without mixture, where a husband and a father is spending his estate, wasting his time, and converting himself into an idiot, or a savage. We have all seen those that thought the same—that they knew what did them good, and could govern themselves; that they were in no danger of being drunkards, and resented even the suspicion of danger. But still they are lost, their business neglected, their property spent, their farms mortgaged, their families ruined! I would that this were only imagination; but I know, and you all know, that it is the truth, and that in numerous instances. But some say this is a land of liberty, and they scorn to be persuaded not to exercise it, in every particular. What a glorious liberty it is for a man to exercise, to leave his business, travel four miles and back, under a burning sun, to vindicate his right to spend twenty cents for rum! to tickle his palate, intoxicate his brain, and burn up his liver—hiding his bottle, and hanging his head like a thief, when he meets those whom he owes and cannot pay. My friends, I paint from real life, but I hope such farmers are scarce. But some farmers yet say they cannot hire laborers, unless they give them ardent spirits. This does for an excuse, when both the owner and the laborer are desirous to use it; but no man who is firm and unwavering, leaves his crops ungathered for want of help; but hundreds of farmers are now ready to testify that they never had their work done when spirits were used, so easy and so well. Seventy physicians of Boston have fixed their names to the opinion, that ardent spirits are never necessary to persons in health: and my own experience in labor and exposure in cold and heat, by night and by day, confirms me in the opinion, that a dose of spirit is no more necessary in health, than a dose of calomel or tartar emetic.—pp. 20, 22.

Nor are we less pleased with our author's remarks on personal industry. We have always concurred in such doctrine as is taught in the following paragraphs. In the South and West, as well as in the North, it is true that—

"the person who should in this age and nation, wear appendages or ornaments, to show that he did nothing, would at the same time, in the estimation of an immense majority, be making himself ridiculous, and showing himself worth nothing."—p. 7.

So also our author properly says—

"It is often literally true that the hand of 'the diligent maketh rich;' but where from any cause it fails to enable a person to gather *heaps of shining dust*, it always in this land enables the diligent to possess constantly and plentifully the necessities and comforts of life, which to every reasonable mind is true riches."—p. 16.

We are also much gratified to see proper encomiums passed on agricultural pursuits. It must be the case, that for at least a century to come, if not always, notwithstanding many and powerful inducements to the contrary, the great body of the solid wealth and influence in this land, must be in the hands of the agriculturist. This is the safest place for it, and we rejoice to see just commendations bestowed upon this class of our fellow-citizens. We too can sympathize with our author, when speaking of farmers he says—

"It was among them, and in their employment, that I spent those years of happy childhood, when every thing makes its deepest impressions. My earliest ideas

of property, were derived from their possessions. To me houses and farms and cattle were wealth, and their owners nature's nobility. While money and notes and stocks and merchandise, appeared fleeting and transient—there seemed something in the possession of *solid acres*, especially when these were *compact farms*, with their venerable mansions, descending from generation to generation, that elevated the possessor, and gave a dignity and character to his pursuits truly honorable and desirable. Nor have these been merely the illusions of youth: they have followed me, and I have cherished them in my riper years. And I view with gratitude that kind Providence, which cast my youth among that class of society. The labors of the field gave a value to my scanty library, and my few hours of study, of which, under almost any other circumstances, I could have had no conception."—p. 5.

"Agriculture at the present day, instead of being a mean, servile employment, is now justly ranked as an important science; and the studies of the learned are now often directed to the most laudable employment of multiplying the fruits of the earth, and improving the quality of the fruits produced."—p. 8.

' We are not so clear in deciding on the character of *all* our author's representations, as on the foregoing. He states some things, concerning which we confess ourselves skeptics. We not only doubt the truth but also the morality, if true, of such a sentence as the following:—

"I would by no means encourage ambition, but still a desire for property, and accommodation (call it by what name you please) is the life-spring of all that is valuable in society."—p. 18.

Nor do we feel altogether so clear as to the utility of agricultural festivals, popularly called "cattle shows." We have been on the northern side of Mason's and Dixon's line more than once, and we have been by our friends carried to the cattle show, and we confess that a good "address" notwithstanding, we did doubt whether more was not lost than gained to the community. Nor are we sure that the perpetuation in any county, of the observance of the "farmer's holiday," would not be a great evil. Not that the design is not good: but invariably, so far as we have seen, the original design is well-nigh lost sight of. Could the original design be kept fairly in view, our judgment might be different. The following sentiment is at least a curious one, containing as it does, what we have never before seen asserted:—

"Larger crops than are here obtained, wherever the hand of the diligent applies the plough and manure with liberality, if attainable, are hardly desirable."—p. 9.

It seems rather strange too for any one to plead against a "rich alluvial soil" in these words:—

"The immense vegetation which annually decays in a rich alluvial soil, saturated with water, is sure in a warm or new country, to render the air unhealthy, and produce bilious and other diseases."—p. 12.

If such reasoning be good, it proves the desert and the "barren sands" better than fertile valleys. Nor will the history of the new countries in the United States justify such remarks as the following:—

"Nor have many of these emigrants considered what they will find painfully true, that they and their generation will have passed off the stage, before their new homes possess the advantages of a New England settlement,—comfortable dwellings, fruitful orchards, good roads, social villages, schools of science and temples of the living God."—p. 18.

We were in the great city of Cincinnati about a generation ago, and it was then about as remarkable for its want of comforts and houses and churches and schools, as it is now, and for years has been, for its possession of them. A larger proportion of the youth of Ohio are acquiring liberal educations, than of those in Massachusetts. Let the doctor re-examine his statistics. Nor could we deem it so terrible a calamity, for the new countries never to be modeled in morals and religion after New England, provided they do better, as easily they might. We see very much to deplore in both these respects in New England. The Macedonian cry of which our author speaks, shows a readiness to be assisted, even in morals and religion, and by New England too. Has it never entered the doctor's mind, that it might be charity to go and abide in the wilderness for the purpose of making the "solitary place glad?" We do further and seriously doubt whether the title of "cradle of liberty" can be properly applied to New England, in the manner of our author. There is no history to justify such a remark. We had supposed, and we still suppose, that liberty was rocked not a little, far south of the land of constant industry and steady habits—the land of "bibles and of Sabbaths"—the land of "red school houses and white churches." Edmund Burke was of the same opinion.

We have mentioned some things in this address, concerning which we had doubts; but we are pained to say, that we find in this publication some sentences, yea paragraphs, which we can but condemn in terms positive and unequivocal. Some of the things relate to the West and South West, and some to the South. As to the West and South West we shall not say much, except merely to give a specimen of the writer's views about that country. We do not remember to have read any thing more fanciful and inconsistent with geological facts, than the following paragraph in reference to the original conformation of the Great West:—

"Casting our eyes to the South West, the country along the lower Mississippi must have been once an immense bay, or arm of the Gulf of Mexico, but the alluvial deposits, floated annually down this immense river, from the boundless west, has filled up this bay; and made most of it into swamp, and part of it into something like dry land. The immensity of waters from three thousand miles and ten thousand hills, still keep a main channel through this wilderness of water and mire and driftwood, and depositing more soil, when the thickened waters first spread from the main channel, than was carried farther back, the banks of the river became much higher than the back country."—p. 11.

The paragraph respecting Mr. Flint is dishonorable both to the writer and Mr. Flint.—

"A clergyman of this state, who was seized with this spirit of emigration, some years ago, and has indulged it to his heart's content, informs us that the villages on the Arkansas and Red Rivers are uninhabitable during summer, and the people leave them and build camps in the woods, and on higher grounds, to escape certain death. He spent one summer in one of these encampments, battling with the mosquitoes, and resolving to improve the first moment of escape to a more northern climate."

Mr. Flint did something else in the West besides "battling with the mosquitoes." How utterly destitute of truth is all that is said about the sirocco.—

"Who to avoid the drifting snow and driving sleet, would leave the land of pleasant sleigh-rides, and happy winter evenings, to breath the sirocco, which sweeps from the Gulf of Mexico for weeks together, up the boundless valley, loaded with the fetid exhalations of a thousand bayous and swamps?"—p. 14.

These are mere specimens of the justice done by our author to the great West. We would remark that we have travelled some tens of thousands of miles in the West, and have not seen any "signs" of what he speaks of; and that during twenty years residence and travel in the West, we never saw a family towards whom even charity needed to feel any compassion on account of want of shelter, or fuel, or substantial clothing, or wholesome food. Can the doctor say *more* of Essex County? But the West can defend itself. We feel ourselves called upon, however, to notice more particularly some statements respecting the South. The doctor seems more anxious to say hard things of the South, little as the tide of emigration from New England is towards it, than of the West. We regret that he did so; but we have the privilege of reply. How could the doctor feel justified in the use of such language as the following?—

"Upon better information, I found that instead of raising fine cattle without labor, they could scarcely raise them at all; that their beef was poor, and a Georgia cow scarcely yielded more milk than a New England goat; and that instead of green pastures all the year, grass hardly grows, and they scarcely know what a green pasture is."—p. 10.

Did the doctor know that the finest beeves in the United States were grazed on the South Branch of Potomac, and that no country produced more fine cattle than the mountainous districts of Virginia, and the upper part of Georgia? Does not the doctor wish he had not written such words? Every Southerner knows such statements to be very different from his own knowledge. His remarks in regard to the health of the South are not any more fair, though more specious and plausible. Hear our author:—

"Along our southern coast, Virginia, the Carolinas and Georgia, present for the most part, for eighty or one hundred miles from the sea, pine barrens, sandy plains and swamps, abounding in noxious insects, and venomous reptiles. A single swamp lying in Georgia and Florida, is one hundred and eighty miles in circumference; and no degree of fertility, or an everlasting summer, could compensate for the pestiferous exhalations, which during many months of the year load every breeze with pestilence and death. Another medical friend, who spent a summer in Charleston, South Carolina, informs me that though the city is extremely unhealthy, compared with northern cities, yet the country around it, is vastly more so. Very few white people live in, and as few as possible attempt to cross over the level country for sixty or seventy miles back of Charleston in summer. To go beyond the ramparts of the city, especially in the night time, is for many months almost certain death! Now what degree of fertility added to our soil, would compensate for such an atmosphere?"—p. 11.

The noxious insects referred to are, we suppose, some more mosquitoes, and the venomous reptiles must be, we suppose, snakes. We have long resided in the South, and although we have never been to London, yet we have been to Boston and to Charleston too. We have also travelled by day and by night, over swamps and rivers and through

"fine" woods, (there are no "pine barrens") yet did we never tread upon, nor were we ever in danger of being bitten by one of the venomous reptiles. But a large swamp is so terrible to our author! Especially one in Georgia, "one hundred and eighty miles in circumference!" seems to be very alarming. Does our author know that swamps in the South contain not stagnant but running water? If not he ought to learn. Does he know that people of great age are found living all around them? No portion of the United States can surpass the South in furnishing instances of great longevity. That there are diseases prevalent in our climate, to which the New England states are very much strangers is certain; but then we generally know how to manage them. One physician in a low county near the Great Dismal Swamp, (be not startled at the name) had in his practice in one year eighty cases of bilious fever, yet did he not lose one patient. Has it never occurred to the doctor that "the land of pleasant sleigh-rides" was also a land of pining consumptions, inflammatory rheumatisms, unmanageable pleurisies, &c.? We know but little of such things in the South. It ought not to be forgotten too, that during the prevalence of diseases peculiar to the South, many of our people travel even to Essex County, and go to Boston too, and when they come home and make speeches before Agricultural Societies, they are careful not to tell scare-crow tales about New England. And did not consumptions, &c., drive our Northern brethren to the South sometimes, we fear that such speeches as the one under review would leave us hardly any friends in New England.

On page 17 of this address is a most unworthy insinuation, viz: that it is a common thing for slave holders to spend their time "at horse races or barbecues." Were this true, we are yet to learn that a "sleigh-ride" is less cruel than a "horse race," or that the manners and morals prevalent in "sleigh-rides," exceed in elegance or purity those of a barbecue. We confess ourselves as much opposed to all frolics as the good people of Essex County can possibly be. But we do consider it unworthy of any professional gentleman to be so ignorant of Southern manners and habits, as to suppose we have in use no modes of employing our leisure time besides those already alluded to, and in addition telling stories in long "happy winter evenings." If we had learned the language of Downingville, we would say that our "dander was raised" when we read the following:—

"Over all the Southern country you might search in vain for an assembly like this. An industrious yeomanry is there unknown."

We confess that we felt emotions of a just indignation when we read those words. We felt as our author would feel if we were to assert the same things respecting Essex County. And yet we could assert it with as much truth as has our author. It is painful to us to notice such looseness and boldness of assertion. Our author's views of slavery are as different from what we suppose to be correct. Hear him:—

"There the taskmaster brandishes his lash, and the slaves labor beneath a burning sun, curse the race that fatten and luxuriate upon their toil, and whet the appetite of revenge and the scythe of death for a day of future retribution. Fathers and mothers of New

England! Could all the gold of Mexico induce you to fix your domicile, and leave your children where their only chance of safety was the prospect of holding a population of two and a half millions, and their rapidly increasing posterity in a state of perpetual bondage? with an equal chance that thirty years will turn the scale, deluge the country in blood, and give the white population only the desperate alternatives of death, slavery, or exile?"—p. 12. "While our Southern brethren may threaten or nullify—change the tariff or perpetrate a revolution,—they will still find they have not reached the cause of their depression. The absence of voluntary vigorous industry, is the real cause of the evils of which they complain. A white population ashamed to be 'seen with implements of labor in their hands,' and a black population doing as little labor as possible, is enough to 'nullify' the prosperity of any country. Perhaps some may imagine that it were easy to grow rich where men possess slaves who labor without wages. But let such remember that these slaves are also men, who must eat or they cannot work—that they must be maintained, the old and the young—the sick, the 'lame and the lazy,' with the taskmasters necessary to make them labor at all, before any surplus can arise to support the luxury of the landlord."—p. 17.

The truth of so much of the foregoing quotations as relate to the unproductiveness of slave property and slave labor is most readily admitted. We have long been of opinion, that ten thousand dollars vested in land and negroes will yield less than the same vested in any stocks in our market, nay that very frequently it is a losing business. Of this Southrons are generally aware. They feel the pressure heavily. And were this the time and place, we think we could show how and why it is so. Nor are we ever going to undertake a defence of the *principle of slavery* which ought never to gain admission into any country or government. We believe that whoever founds a State in wisdom excludes slavery. We believe that no evil presses on our Southern country with equal force and that "he ought to have the King's daughter in marriage," who will devise any just and practicable method of removing it, without introducing greater evils both to black and white. But against such statements as those just quoted we must lift up our voice. One impression intended to be made by these statements is, that there is cruelty in the amount of labor required of slaves in the South. In the vast factories of the South, hands earn from fifty cents to two dollars per week by doing work beyond the tasks required of them. On Southern plantations where labor is performed by tasks, the tasks are generally performed by 2 or 3 o'clock, P. M. Another thing in the paragraphs quoted is offensive to us. It is the apparent pleasure the writer seems to take in telling how dark the prospects before the Southrons are. The fact that probably in thirty years the South will be deluged in blood calls from him no regret, not even a note of exclamation or a prayer to the throne above. But like certain preachers who say much about the wrath to come, he seems to have real pleasure in his denunciations. Another impression evidently intended to be left on the reader's mind is, that slaves generally in the South are under the "care of some hireling taskmaster," and that the usual method of getting along is by "brandishing the lash." Our author ought to know that generally slaves are now spoken of and regarded as a part of a man's family, and that in sickness the master or mistress are the assiduous

nurses, watching day and night; and that not one in fifty of Southern slaves is committed to a steward without the liberty of appeal and complaint and reference to the proprietor. As our author does not seem to know much about modes and manners in the slave holding States, we would like to read him a short lecture on the subject; but we hope what we have said will lead him to more careful and extensive inquiry. It is not many years since two men in New England killed their wives. What would Dr. Spofford think, should one of the Southern papers assert that the New Englanders were murderers of their own wives? The general impression made on our minds when our author describes the South, is very much such as would be made on his mind, were we, who never saw him, to send him his own likeness drawn by ourselves. The serious objections we have to such representations as those referred to are—

First. That they are calculated to keep those to whom they were made, with views as narrow, and feelings as illiberal, as they had before they read or heard the address; whereas *no educated man* is excusable for not warring against prejudices and illiberal views in himself or others.

Second. They show a want of sacred regard and tender interest for the perpetuity of our National Union. Such is the spirit of most of the contents of page 17. And he who shall help to sever this union, formed as it was, upon the full recognition of slavery, as a matter not to be touched by any but slave holders, will be spoiling the best pattern of a free government that has ever been given to the world.

Third. All such representations betray an amount of ignorance that we cannot pass by without reproving. We are fully of the opinion of the author when he says—

"True these opinions would be of more weight if they came from abroad, or from one who had travelled extensively."—p. 16.

Why will not the doctor travel? We ought in all frankness to say to him, however, that we do not suppose it would be safe for him to travel in the South, except in disguise. Such statements as are in his address would be very apt to be noticed could their author be seen. The Southern people are of one mind in intending to let no man interfere with their domestic relations. Men can say what they please on the north side of the Potomac, but having said *such* things there, it would hardly be safe to travel in the South. The reason is, we know who are apt to scatter "arrows, fire brands and death."

Fourth. We also agree with our author when he says:—

"I should consider [ought to consider] myself as criminal, were I to traduce the character of a country, as the character of an individual."

Oh doctor! you have traduced the characters of some millions of your countrymen. Recant—repent—reform!

We have not much to add. We wish to state however, for the doctor's information, that we have some good things in the South. It is true we are rather scarce of "venomous reptiles," but in the "far South" we have very fine alligators which are equally valuable. We have also some very fine swamps, which furnish immense quantities of timber, found profitable to us and valuable

to our northern friends. We have also very fine pines, which soon restore exhausted lands, and the wood from which bears exportation to northern glass works. We have also some literature in the South. We have the Spectator, the Rambler, Dr. Spofford's Address at the Cattle Show, and frequently a newspaper from Boston, and so on. We have also, especially in Virginia, some very fine tobacco, which always sells well at home and in France. We have also no small quantity of "lugs," which when twisted into "plug" and "pig tail," sells very well in New England. We also grow very good gopher pens and sweet potatoes, yams, &c. We also find our raw cotton from the highest "upland" to the "sea-island" in good demand, not only in Liverpool, but also in New York and Providence. Our cotton cloths and yarns also do not suffer in comparison with any in the world. We can also let our northern ship builders have a good supply of tar, pitch, turpentine, plank and timber. Indeed we value ourselves not a little upon our "live-oak." There is also left among us some degree of patriotism, in so much as that none can disturb our domicils from abroad without suffering for it. We are also a very peaceable people. We have always had, and still have, our full share in the Federal Government. We have never complained that the South has not furnished her full quota of presidents, orators, and able statesmen. We have also along our southern coast neither "eighty nor a hundred miles from the sea," lands, which have been in cultivation for more than a century, and were never artificially manured, and yet yield as good crops as they did eighty years ago. We have also as good land as Essex County generally contains, within less than one hundred miles of the sea, and supplied with inexhaustible beds of calcareous manure, for sale at from \$1 to \$2 per acre. And last but not least, we are very glad to see amongst us all "*Northern gentlemen*," who do not "traduce" us before they leave home, and to show to them a degree of hospitality, which they shall be compelled to declare Essex County never surpassed.

Finally, we are much gratified that our author confesses that New England is not perfect. He says she has "the drifting snow and driving sleet," and that "the cold seasons of 1812 and 1816 and the intermediate years" were to some rather alarming; that the "lands are not enriched by the alluvion of rivers three thousand miles long," and that "the sceptre of political power has departed." We are sorry that any such evils should have come on New England, a land which our fathers taught us never to "traduce," but always to give her "an honorable place in her country's annals." But as they have come upon her, we are pleased that our author has ingenuousness sufficient to make the confession.

ON BUCKWHEAT AND MILLET.

To the Editor of the Farmers' Register.

Rockingham, August 12th, 1834.

Should none of your correspondents more satisfactorily answer the inquiries of H, in the June No. of the Farmers' Register, on the subject of buckwheat and millet, the following remarks, the results of some experience on those subjects, are

submitted, which, (if you think they can be of any use to H or any body else) are at your service.

On the subject of buckwheat he inquires, "whether it is as great an impoverisher of land as oats, and whether if turned in it becomes a good fertilizer? What soil is best adapted to its growth, and what quantity of seed is generally sown to the acre?" I think, and I believe it is generally so thought, in this neighborhood, where both are commonly raised, that buckwheat is a greater impoverisher than oats; its straw *either green or dry*, is of less value for manure, than the straw of any other kind of grain. Any soil in this section of the state produces it abundantly: a thin sandy soil, that will produce a good crop of no other kind of grain, will bear a tolerably good one of buckwheat. And although the quantity of straw will be much greater on a rich, there will be *less grain*, than on a thinner soil. On rich land, it rarely fills well, but on a suitable soil, and in a favorable season, the product is very great. The quantity of seed sown to the acre and the *time* of sowing should, I think, depend upon the object in view in sowing it. When the grain is the object, half a bushel, or three pecks is ample, as it throws out many lateral branches. When designed to be ploughed down as green manure, I would sow a bushel—sown early in the season it produces more straw—when later more grain,—indeed the later it is in ripening, so as to escape frost, (a slight frost will kill it) the greater will be the product of grain. For green manure I would sow in May or early in June, (two crops may be ploughed down in the same season:) if I wished to reap the grain, I would not sow till after the middle of July. I have sown it in August, and at the same time, sown rye and cloved seed, upon the same ground, and all three succeeded well.

Millet. On this subject H inquires whether "millet is made to any extent in any of the United States? What soil suits it—is it an exhauster, and what is the price per bushel?"

A species of millet, (very much resembling the fox-tail grass, only of a much finer, richer appearance) was raised to some extent, some few (perhaps 8 or 10) years ago in the Valley. None is raised hereabouts now. It requires a very rich soil, very neatly prepared. It is certainly a great exhauster. When in repute here, (it had but a short day) the price per bushel was about \$2. It could not now be given away, to be sown here.

On a suitable soil, that is, one rich enough to produce a fine crop of hemp, it produces well both in hay and seed—the seed when ground, made a fine rich looking meal, and was excellent food for milch cows—the hay when well cured, is nearly equal to timothy. Its sponsors pronounced it "preferable to either clover, meadow, or timothy hay." But "*chacun a son gout*," seemed to think all my horses and cattle: they all preferred the clover.

In the memoirs of the Pennsylvania Agricultural Society, (1824) John Hare Powell says, "I have made many experiments, on various soils, and at different seasons to ascertain the product, as well as the properties of millet. Upon light land in good condition it succeeds best. It requires in all cases fine tilth and as much strength of soil, as is necessary to produce heavy oats. I have not seen either in Europe, or America, any green crop which so largely rewards accurate tillage, and

plentiful supplies of manure, as the species of millet usually grown in this and the adjacent counties. I have sown it from the 1st May to the 20th of June, and have invariably obtained more fodder than could have been had from any grass under similar circumstances. In the autumn, eighty bushels of caustic lime per acre were strewed upon an old sward, which was immediately ploughed, closely harrowed, sown with rye, and rolled. The rye was depastured in the winter and succeeding spring. Early in April the land was ploughed again; the lime and decomposed vegetable matter were thus returned to the surface. About three weeks after, it was harrowed to destroy weeds: early in May it was again harrowed for the same purpose: within a fortnight it was stirred with Beatson's scarifier to the depth of nine inches, harrowed, sown with millet and rolled. The crop was fairly estimated at three tons per acre." "On the 5th of May, five bushels of millet seed were sown on four acres: on the 5th of July the crop was hauled, and estimated at four tons per acre. I have obtained this season forty tons from sixteen acres, of which four only had been manured; the residue could not have borne a good crop of wheat."—pp. 198-9.

Wm. J. Miller, *ib.* p. 201, says, "I sowed it (Egyptian millet) in drills on a loose sandy loam, on the 21st of May, too late by a month I should suppose. It grew rapidly, producing many stalks from one seed, and on the 24th of July it was three feet high and full of long blades. It continued growing rapidly and luxuriantly, and I fully expected to have obtained abundance of seed, as the heads appeared to be filling, and were from twelve to eighteen inches long, when on the 28th of September a severe frost checked it, and nipt it completely when in blossom. It was then from ten to twelve feet high, full of long leaves, and promising the largest crop of any description I ever saw."

John Elliott, *ib.* p. 208, says, "I am of opinion that land in common condition, will produce twenty bushels per acre of good seeds, and two tons of hay."

From reading such highly commendatory accounts as the foregoing, many of us really imagined that this millet possessed almost as many excellencies as old Will Boniface ascribed to his ale. All however in this neighborhood who tried it, agreed that "it was'n't the thing it had been cracked up to be." As material for hay, compared with red clover, I should give a decided preference to the clover. If millet will yield a greater quantity, (which can only be the case on very rich land) the superior quality of the clover hay will more than compensate for any deficiency in quantity—and the one exhausts, while the other fertilizes the soil. Compared with timothy, (both exhausters) I should give to timothy the preference. The latter yields as much hay—is of better quality—affords a good fall pasture after the hay has been made, and will last for several years; while the millet has to be annually sown, and requires great labor and care to be bestowed on the preparation of the ground, and of the two is much the greater exhauster. But I may possibly depreciate millet (may be "I feel an ambition against it") because I failed with it. When it was first introduced into notice in the Valley, seeing its praises so eloquently set forth in several publica-

tions, and hearing too some very extravagant oral accounts of it, I procured ten bushels of the seed at the cost of twenty dollars, and with the trouble of sending some distance for it. Having no suitable lot for it, I had several acres in a field of rich river low ground, lately laid down in red clover, broken up, and carefully prepared. Here I sowed the millet, (about the middle of May:) it was somewhat slow in starting to grow, and the crab or crop grass sprung up with it, and materially injured it, and I doubt whether I had much more millet hay than I should have had of clover. Upon this rich alluvial soil, I had calculated upon an immense crop—judge then of my disappointment and mortification, when I found the millet struggling for mastery with crab grass, and when finally it did rise above that, and some of it attained the height of four or five feet, to be laughed at for my credulity, and told in ridicule that "it was nothing but a kind of big fox tail." My father who received those magnificent accounts of the productiveness and excellence of millet "*cum grano salis*," thought it wiser to experiment upon a smaller scale and confined his trial of it, to a single acre of very highly improved land that had been prepared for hemp. He succeeded much better than I did, although I do not think that his millet was half as high as his hemp in the same lot. However well millet may do elsewhere, I think that the disappointment in the central counties of the Valley was universal. Here where the climate and soil are so admirably adapted to the growth of clover, timothy, and green sward, there was no adequate inducement to bestow so much pains on the cultivation of a grass so much more precarious, and of such inferior value.

The object of his inquiries H states, is to ascertain what cheap grain is most suitable to sow on poor, light, sandy land in Lower Virginia. Assuredly then millet will not answer his purpose. Has rye ever been tried for that purpose in that section of the State? In the Valley it grows well on poor, sandy land, and I have known one gentleman who used it as a meliorating crop, and much to his satisfaction. His lands however were not poor. His practice was to sow rye early in the fall—depasture it in the winter and spring until about the middle of April: when the rye had attained the milk state, he turned his stock of hogs into it. The hogs soon became very fat, and he thought the additional quantity of pork thus obtained more than compensated for the whole trouble and expense of preparing the land and sowing the rye, while his land was much benefited by the straw. Enough of the rye would ripen and be shattered out, again to seed the land and a good crop, the second year be obtained. If the climate be favorable to the growth of rye, I should think it would be preferable as a meliorating crop to buckwheat, because rye is not near so great an impoverisher as buckwheat, and its straw is much more valuable as manure: and also where the land is in a tolerably good condition, the winter pasture which the young rye affords is of considerable value.

Would not an experiment of this kind probably succeed? A crop of buckwheat sown in the spring; ploughed down in the fall; the ground sown with rye; on that clover seed sown; and the sowing of the clover seed followed by the peg roller—the young buckwheat receive a dressing of plaster of

Paris, and also the rye at the time of sowing the clover seed (say in September.) The rye suffered to stand, ripen, and fall upon the ground would protect the young clover from the withering influence of the sun, and benefit the land very much by remaining upon its surface—perhaps as much, or more on such a soil, than it would do if ploughed under. Such an experiment upon a few acres would not require much trouble or expense. Many persons take it for granted, that their lands will not produce clover, or be benefited by plaster of Paris, without ever making any sufficient experiment to ascertain the fact. Some sprinkle a little clover seed carelessly and sparsely over a poor and nearly naked surface, without using any means to ensure its growth; and a failure is taken as conclusive evidence that their lands will not produce clover. The wonder would be, if under such circumstances it did grow. Light sandy land requires to be well compacted by a heavy roller, (or other means) to ensure the growth of clover seed. I became satisfied of this fact, by observing that wherever the soil was lightest and loosest, my clover seed always succeeded worst; and whenever a road had been made through that part of the field, by the wagons in hauling out the preceding crop, or a spot trodden hard by the stock of cattle, &c., there the young clover was invariably thickly set. I find that plaster of Paris has not only the effect of very greatly multiplying the product of clover on my light sandy land, but of very perceptively stiffening it. The year before the last, I measured two acres of wheat, growing upon an originally poor, light, loose, sandy soil, the natural growth on which was pine and hickory and oak saplings, with chinquapin and whortleberry thickly interspersed. This land has been in cultivation for ten or twelve years, in which time it has had its regular rotation of cultivation and rest, according to the five field system, (three crops of grain and two of clover in five years;) when in clover it has had at four different times a dressing of a bushel of plaster of Paris to the acre; never has had a particle of manure hauled upon it. The product of the two acres was over fifty-two and a half bushels of clean wheat. When first cleared, it was an easy draft for two horses to plough it eight or nine inches deep, and produced from twenty-five to thirty bushels of corn to the acre, and from ten to twelve of wheat. It is now a heavy draft for three strong horses with a McCormick plough to fallow to that depth. This increased stiffness of the soil, is doubtless attributable in part to other causes, than the action of plaster of Paris. The two acres measured were part of a field of between eighty and ninety acres, only a small portion of which was of the description of soil above stated. The average of that portion of the field in wheat (a part of which, seven or eight acres, had been manured with stable and barn yard manure) was within a fraction of thirty bushels to the acre; a part of the field was in rye—thirty-five acres in wheat produced 1030 bushels. Ten years ago on the same land, the average would not have exceeded twelve bushels to the acre. These thirty-five acres, being inferior to the residue of the field, I had a division fence run across it when last in clover, for the purpose of preventing this part from being too closely grazed—a good coat of clover was in August ploughed down, and the ground harrowed—the first of October it was cross plough-

ed; (my usual practice is not to cross plough or "stir the fallow" as it is called) on the 10th of October, one and a half bushels of wheat to the acre were sown, and carefully harrowed in.

S. H. L.

EXPERIMENTS ON THE FEEDING OF SWINE.

Extract from a communication to the Agricultural Society of Essex, (Mass.) from the Rev. Henry Coleman.

EXPERIMENT I.

Two hogs about one year old; one of them a barrow in very good condition; the other a barrow recently gelded, and in ordinary condition, were put up to be fed exclusively upon Indian hasty pudding or Indian meal boiled with water. We began feeding them the first of March 1831, and weighed them again on the nineteenth of the same month. In the 18 days they consumed six bushels of Indian meal. They were offered cold water to drink but did not incline to take any.

The result—

No. 1 weighed on 1st March	233 lbs.
do. do. 19th do.	269
gain	36
No. 2 (recently gelded) weighed on 1st March	190 lbs.
do. do. 19th	247
gain	57

The gain of the two was 93 lbs. in eighteen days. The quantity of meal consumed by them was 10 quarts per day to the two. This allows 30 quarts to a bushel deducting two for grinding. The price of corn at the time was 70 cts. per bushel. The expense of the increased weight is 4,5 cts. per lb.

March 21, 1831. Killed the hog mentioned first in the foregoing experiment. Live-weight 273 lbs. Weight when dressed 215 lbs. Loss in offal, loose fat included, 59 lbs. or a little more than one fifth.

EXPERIMENT II.

No. 2, mentioned above, weighed on 23d March,	253 lbs.
do. on 30th April,	312
In 38 days gain,	59 lbs.
No. 3, a shoat purchased from a drove, weighed on 28th March,	100 lbs.
do. do. on 30th April,	151 lbs.
gain in 38 days,	51 lbs.

This is a fraction over 1 lb. 8 oz. per day each, nearly 1 lb. 9 oz.

In this case their food was exclusively boiled potatoes mashed with Indian meal. Exact amount consumed not ascertained, but fed as freely as they would bear.

EXPERIMENT III.

The two last named hogs were for the next 90

days put upon Indian hasty pudding exclusively, with the following result:

No. 2 weighed on 30th April,	312 lbs.
do. do. 20th May,	382 lbs.
gain in 20 days,	70 lbs.

No. 3 weighed on 30th April,	151 lbs.
do. do. 20th May,	185 lbs.
gain in 20 days,	34 lbs.

The two in the above named 20 days, consumed four and one-half bushels of meal, cooked as above. Meal 78 cts. per bushel. Gain of the two, 104 lbs. in 20 days.

EXPERIMENT IV.

Sundry swine purchased from a drove, and fed with meal and potatoes, washed and mashed—

28th March, 1831,	19th May, 1831,
No. 1 weighed 97 lbs.	165, gain in 52 days, 68 lbs.
2, do. 134	182, do. 48
3, do. 100	186, do. 86

The two following, raised on the farm, and fed as above—

25th April, 1831,	19th May, 1831,
No. 4 weighed 151 lbs.	206, gain in 24 days, 55 lbs.
5 do. 140	165 do. do. 26

EXPERIMENT V.

In this case it was not intended to force their thrift, but to keep the swine in an improving condition. They were shoats of the last autumn, and were of a good breed.

Tuesday, 3d April, 1833, put up four shoats, and began feeding them with Indian hasty pudding.

3d April,	22d April,	25th June,
No. 1, 176 lbs.	202 lbs. gain 25	264 lbs. gain 62
2, 119	153 " 34	226 " 73
3, 150	170 " 20	218 " 48
4, 121	145 " 24	Killed 20th May.

From 3d April to 22d April, the above swine consumed seven bushels and one peck of Indian meal. From 22d April to 25th June seven bushels of Indian meal, cooked as above.

One of the above, No. 4, was killed on 30th May; being absent, the live weight was not ascertained.

On the 25th June, the three remaining hogs were weighed, and in the 63 days from 22d April to 25th June, they had gained in that time 183 lbs. as above.

After 30th May, when one of them was killed, one peck of meal made into hasty pudding with a small allowance of the waste of the kitchen for a part of that time, lasted them three days, that is $\frac{2}{3}$ or less than a quart, say $\frac{1}{4}$ of a quart per day to each.

At first we employed half a bushel of Indian meal to make a kettle of hasty pudding; but we soon found that a peck of meal by being boiled sufficiently would make the same kettle nearly full of hasty pudding and of sufficient consistency.

The kettle was a common sized five pail kettle, set in brick work in the house; and it was remarkable that the peck of meal produced nearly the same quantity of pudding, that we obtained from the half bushel, which showed the importance of inducing the meal to take up all the water it could be made to absorb.

The price of Indian corn was at that time 75 cts. per bushel—30 quarts of meal to a bushel deducting the toll. The amount of meal consumed in the whole time from 3d April to 25th June was 14 $\frac{1}{2}$ bushels—the cost \$10.69—the total gain, making no allowance for the gain of No. 4 from 22d April to 30th May, which was not ascertained, was 287 lbs.

The gain of No. 1, 2 and 3, from 22d April to 25th June was 183 lbs. in 63 days; and allowing one peck to serve the three hogs for three days, required 5 $\frac{1}{2}$ bushels, the cost of which was \$3.94. The live-weight could not be estimated at less than 4 cts. per pound when pork was at market 6 cts.

The value of the 183 lbs. therefore was equal to \$7.32, or at 5 cts. to \$9.15 cts.

The gain of the swine for the first 19 days, from 3d to 22d April, was

No. 1, 26 lbs.	or 1,368 per day.
" 2, 34, "	or 1,789 "
" 3, 20, "	or 1,052 "
" 4, 24, "	or 1,263 "

The gain from 22d April to 25th June, 63 days, was,

No. 1, 62 lbs.	or 0,984 per day.
" 2, 73, "	or 1,158 "
" 3, 48, "	or 0,761 "

The difference of daily gain in the two periods was attributable to the diminished quantity of meal. The question then arises, whether the first mode of feeding was as economical as the second.

In the first 19 days, 7 bushels 1 peck consumed, gave 104 lbs. gain.

In the next 63 days, 5 bushels 1 peck consumed, gave 183 lbs. gain.

Had the first gain been in proportion to the second gain in reference to the meal consumed, the 7 $\frac{1}{2}$ bushels which gave 104 lbs. should have given 252 lbs. This great disparity can be explained only in the more economical preparation of the meal, by which a peck, taking up as much water as it would contain, gave a kettle nearly full of pudding, when half a bushel of meal, imperfectly prepared, gave little more. This seems to demonstrate the great advantage of cooked food, both as it respects its increase of bulk and the improvement of its nutritive properties. Whether it would apply to those substances, whose bulk is not increased by cooking, equally as to Indian meal and the like, is a matter which experiments only can determine.

Such are some few trials in reference to the feeding and fattening of swine, which I have made, or information of which I have obtained from other sources, which may at least lead the inquisitive farmer to further experiments and inquiries, on a subject of great importance to his interest. The inferences to be made from them I shall leave to others. The results, as will be observed, are not uniform. The thrift of animals must depend on various other circumstances besides the kinds or

the quantity of food given them. Much depends on the breed, as every farmer knows; much on the health of the animal; something on the season of the year. I failed in attempting to fatten several swine in one case, though they were carefully attended and various kinds of feed were tried, and the failure was totally inexplicable until they were slaughtered, when the intestines were found corroded with worms, resembling those found in the human stomach, and this, I have no doubt, prevented their thrift. The same fact has occurred in another instance, and with the same result. I failed in attempting to fatten some other swine, who had been driven a considerable distance and exposed, probably not even half fed on the road, to severe cold and storms. Some of them were frost bitten in their limbs; and though attended and fed in the most careful manner they made no progress for months. In an experiment recently made, of giving swine raw meal mixed with water, I have found a falling off in their gain of nearly one-half, compared with giving their food cooked, such as boiled potatoes and carrots, mixed with meal while hot; the result being, in a sty containing a number of swine, as 279 to 500. In respect to confinement or freedom, various opinions are entertained. "Elder Turner, of New York, says, that hogs should never know what liberty is, but should be kept close all their lives, and as inactive as possible. That by this method double the quantity of pork can be produced with the same expense of feed."* F. Peabody, Esq. informed me that the Shakers at Canterbury, N. H. told him that they deemed it indispensable to the thriving of their swine that they should have access to water to wallow or wash themselves in; and that they by no means did so well without it. On this point I have had no trial farther than to satisfy myself that fattening hogs are injured by being suffered to root in the earth.

With respect to the age at which it is advantageous to put up swine to fatten, I have only to remark, that it is with swine as with other animals, there are some breeds which come much sooner to maturity than others. A successful farmer in Saratoga county, N. Y., says that March pigs, killed about Christmas, are the most profitable for pork. Four pigs of what is called the Grass breed, were slaughtered at Greenfield, New York, which weighed 348 lbs. 318 lbs. 310 lbs. and 306 lbs. at nine months and seventeen days old.

On this point, however, I take leave to present a letter with which I was honored by John Lowell, Esq. whose authority in the agricultural community is justly estimated.

"BOSTON, April 18, 1831.

"To Rev. Henry Colman.

"Dear Sir,—I have been prevented by the state of my eyes from answering your inquiries as to my experience in raising old or young pigs.

"I never wintered any pigs, as no person resides on my place from December 1st, to May 1st. It was therefore matter of importance to me to ascertain on what description of pigs, or rather of what age, the most flesh could be put in my limited time with similar treatment. I may say that I have fully and clearly ascertained, from a trial of 20 years, that young pigs of from 25 to 30

pounds, will give nearly double, in some remarkable cases three times, as many pounds as shoats of six months weighing from 100 to 150. I have taken two pigs of 100 lbs. each, age six months, and never was able between May and November, to get them above 180, rarely above 170. I have taken three pigs of about 30 lbs. each, and on the same food which I gave to the two they would weigh from 170 to 180 each in the same period;—nay I have taken pigs of 200, and never could get them to weigh more than 300 in 7 months on my food. The way I ascertain the quantity of food is that I never give any thing but the produce of my dairy, and the refuse of the garden, peaches, apples, and cabbage, which are uniform generally.

Three pigs of 90 wt. or 30 wt. each, will give	ordinarily	510 lbs.
	less original wt.	90 often
not more than 60.		gain 420 lbs.

Two pigs of 100 wt. each, will give	ordinarily	340 lbs.
	less original wt.	200
		gain 140 lbs.

"But the 3 pigs of 90 will not consume for the first three months half so much as the two of 100 each, and I have kept a 4th and sold it in August for quarter pork.

"There is nothing new or remarkable in these facts. It is the law of the whole animal creation. It is true of the calf and of man. The child of 7 lbs. quadruples its weight in 12 months; and the calf of 60 weight if fine and well fed will weigh 600 weight at the end of the year, and (if a female) will not double the last weight at any age.

"Yours, very respectfully,

"J. LOWELL.

"P. S. It should be remarked that the weight at purchase is live-weight, and at sale dead or net weight, because in truth to the owner this is the true mode of considering the subject. No doubt my sort of food is peculiarly favorable to young animals, it consisting in very liberal allowance of milk. If the older pigs were at once put on Indian meal they would attain to 250 at a year old, but the cost of the meal at 70 cents per bushel would amount to 9 dollars, and if the first cost, 5 dollars 50 cents, be added, and the pig sold at 6 cents, there would be but two dollars gain on two pigs of 100 lbs. each; while three small pigs without meal fed on milk would give 24 dollars in the same time. I do not mean to give minute details but general views. As an important qualification of the foregoing statement it should be added that shoats of six months bought out of droves have usually been stunted in their growth, and animals, like trees, recover slowly after a check. I presume if shoats were taken from a careful and liberal owner the difference would be less. But as a general law it may be safely affirmed, that weight for weight at the purchase, the younger the animal the greater the positive, and the far greater the net gain. At least such is my own experience and belief."

The foregoing letter of this intelligent and practical farmer is entitled to particular consideration. I have one or two other statements, which deserve attention. It is stated in the Domestic Encyclopedia, article Soiling, that "twenty-five shoats were fed for three months with green clover cut from less than one acre; they were then fed on Indian corn and when killed weighed three thousand pounds. This is certainly an extraordinary statement, and I have no other authority for it than what is here given. But the Rev. Thomas Mason, of Northfield, Mass. showed me the 27th September last, three fine thrifty swine about nine months or more old, nine-tenths of whose feed, as he assured me, since the 13th of May last, had been obtained from one-eighth of an acre of clover cut and given to them green.

The preceding facts and experiments encourage the belief that hogs may be raised and fattened by the farmer to advantage, where corn is worth about seventy cents per bushel, and his pork will bring him six cents per pound. Like almost every other business, especially of an agricultural nature, success must greatly depend on skill, care, selection, and good management. The best swine that I have ever found have been in dairy countries, for there cannot be a doubt that milk and whey for every animal are among the most nutritious of aliments. Indian meal probably ranks next, though many farmers prefer a mixture of provender, such as corn, oats, rye, or barley; but I believe in all cases cooked food will have a decided advantage over that which is given in a raw state: an advantage more than equivalent to the labor and expense of its preparation. Potatoes are a valuable article of food, but the pork is not so good as that fattened upon corn. Carrots are more nutritious than potatoes. Corn given in a raw state or on the ear is a most wasteful management.

Swine ought to be kept on every farm in sufficient numbers to consume all the offal and waste of the dairy and kitchen. If beyond this, a breed can be obtained, which will arrive at early maturity, and which can be advantageously grass fed or kept at a small expense and in an improving condition through the summer; and being put up to fatten early in autumn and forced as much as possible so as to be sent to market early in the winter, the farmer will ordinarily find a fair profit in this branch of husbandry. A very great advantage is found in the keeping of swine from the valuable returns of manure both in quantity and quality, which are obtained from them, where care is taken to supply them with raw materials for the manufacture. Too much care cannot be bestowed in the selection of the breed and the general health of the animal when put up to feed: and it is strongly recommended to every careful farmer occasionally to weigh the animal and measure the feed, that he may ascertain seasonably on which side the balance of debt or credit is likely to fall. Nothing is more prejudicial to good husbandry than mere guesses and random conjectures; and though the result of our operations may not meet either our wishes or expectations, an intelligent and reflecting mind will be always anxious as far as practicable to know precisely how far they correspond with or disappoint them. Truth, exact simple truth, in every thing, is the proper pursuit and the most valuable possession of the human mind;

and more nearly than any thing else connected with man's true interest and happiness.

HENRY COLMAN.

Meadowbanks, Deerfield, 20th April, 1834

ON PLUCKING THE FEATHERS FROM LIVING GEESE.

From Moubray on Poultry.

A writer in the Monthly Magazine, December, 1823, remarks humanely on the cruelty of plucking the living goose, proposing a remedy, which I should rejoice exceedingly to find practicable and effective. He remarks on the additional torture experienced by the poor fowl, from the too frequent unskilfulness and want of dexterity of the operator—generally a woman. The skin and flesh are sometimes so torn as to occasion the death of the victim; and even when the fowls are plucked in the most careful manner, they lose their flesh and appetite; their eyes become dull, and they languish in a most pitiable state, during a longer or a shorter period. Mortality also has been periodically very extensive in the flocks of geese, from sudden and imprudent exposure of them to cold, after being stripped, and more especially during severe seasons and sudden atmospheric vicissitudes. There are many instances, in bleak and cold situations, of hundreds being lost in a single night, from neglect of the due precaution of comfortable shelter for as long a time as it may appear to be required. The remedy proposed, on the above authority, is as follows: Feathers are but of a year's growth, and in the moulting season they spontaneously fall off, and are supplied by a fresh fleece. When, however, the geese are in full feather, let the plumage be removed, close to the skin, by sharp scissors. The produce would not be much reduced in quantity, whilst the quality would be greatly improved, and an indemnification be experienced, in the uninjured health of the fowl, and the benefit obtained to the succeeding crop. Labor also would be saved in dressing, since the quilly portion of the feathers, when forcibly detached from the skin, is generally in such a state, as, after all, to require the employment of scissors. After this operation shall have been performed, the down from the breast may be removed by the same means.

A VILLAGE DEPOPULATED BY THE "MILK SICKNESS."

[The singular and fatal disease to which are ascribed the effects stated below, was described in Vol. 1, of the Farmers' Register.]

The following extract is of a letter from a traveler dated at St. Louis:

A few miles below Alton, on the Mississippi, I passed a deserted village, the whole population of which had been destroyed by the "milk sickness." The hamlet consisted of a couple of mills and a number of frame houses, not one of which was now tenanted: but the dried weeds of last year choked the threshold of the latter, and the raceways of the mills were lumbered up with floating timber, while the green slime of two summers hung heavy on the motionless wheels. Not an object but ourselves moved through the town; and

the very crows themselves seemed to make a recruit around the fatal place when they came in view of the thickly sown burial ground on the skirts of the deserted village.

THOUGHTS ON REARING FRUIT TREES.

To the Editor of the Farmers' Register.

Prince Edward County, July 9th, 1834.

Much has been said and written, and a great deal of useful knowledge has been presented relating to the best modes of rearing orchards; yet by far the greater part of what I have heard and read upon the subject, has been but opinion bottomed upon nothing better than opinion, without any certain knowledge, or known facts, to sustain those opinions. The truth is, that orchards do well in some soils and situations, under almost any course of management, attended with the least care; whilst with like care and management, in other soils and situations, they utterly fail. Few persons live long enough, and still fewer are sufficiently observing and attentive, to draw any just conclusions, as to the best modes of rearing orchards of any kind of trees, which are long in coming to maturity, being for the most part utterly ignorant which may be the best, of any two modes which have been practised. Records have been still more rarely kept, and seldom contained much useful information, yet they must be the main reliance, for transmitting any large portion of valuable knowledge to posterity, upon all subjects which require many years to bring them to maturity.

It is now tolerably well understood, and believed to be the fact, that the stock of fruit trees wears out, and that they assume in early life, the decrepitude of old age, by being raised by grafting repeatedly from different sets of trees, raised the first from a vigorous seedling stock, the next from a grafted tree, the third from the second grafted tree, and so on: and the ill effects are thought to be greatly increased, by grafting from old bearing trees; which if true, as I believe it is, threatens in time to extinguish the different races of our best fruits. Is there any remedy known for this evil? I propose an alleviation: perhaps it may prove to be a remedy. Graft always with water sprouts or suckers, and never use limbs from the bearing part of the tree for grafting, nor any limbs that would probably blossom or bear fruit the same year they are grafted, if they had been left to grow on the parent tree. Trees raised by grafting with water sprouts, it is well known are more thrifty, than those raised by grafting with the bearing twigs; and equally well known, that the water sprouts require much longer time to arrive at the bearing state; from which it may be presumed they will be longer lived. To those who can afford the means, I propose what will perpetuate the same, or in all reasonable probability full as good stocks of apples and pears, and more certainly of all stone fruits. Plant seed of the most choice kinds in drills, say six feet apart: let the trees stand 18 inches apart along the drills, which will give 4840 trees to the acre. At this distance they may be forced to bear fruit in four or five years, when with good land and tillage, they will probably be an inch thick four feet from the ground—when, as soon as vegetation begins in the spring, cut round the bark of the trees, quite down to the wood, in two rings, rather less than a quarter of an inch apart, and

take out the belt of bark entirely to the wood. Those narrow belts will commonly heal over before winter, and next year the trees will bear fruit, when all the worthless kinds may be destroyed, and the good may be preserved. If the good should not stand in such regular order as would be desirable for an orchard, twigs might be grafted from the best kinds in regular order, as there would be certainly a great abundance of stocks for the purpose. If only one tree in 100 should be of the same, or as good a kind as the seed sown, it would give 48 good kind of trees to the acre, which would be more than enough to raise to full growth in an orchard. It is doubtless known to many of your readers, that the discovery of forcing young trees prematurely to bear fruit, is not new, but has been published a considerable time. Its only use to which I have applied it, is in forcing young seedling and other unknown kinds of trees to bear fruit early, that I may not be at the trouble and expense of raising worthless trees to full growth for bearing before I know what kind of fruit they will bear—and that I may commence the rearing of good kinds at the earliest periods. If the belting at the height of four feet should cause the top of the tree to assume the appearance of age and decrepitude, it may be cut off at the belt, and suffered to form its top from limbs coming out below the belt. Trees of sufficient size and height, might be belted as high from the ground as might be desirable to top them, if four feet should be thought too low.

I can say little on the subject of pruning. I have found it sometimes of infinite service. No stout limb should ever be cut off near to the body of a tree, nor near to the trunk of a large limb, as decay immediately commences, and the trunk or body becomes doated, rotten, or hollow. If it should ever be found necessary to prune off stout limbs, let them be cut off smooth, at such distance from the trunk or body, that the stumps may not die down to the main limb or body of the tree. This will however be productive of considerable trouble, as the stumps of limbs almost invariably send out many sprouts, which it will be proper to keep pruned off.

It seems to me certain, that the best season for pruning, is from the time vegetation becomes active in the spring, till the descent of the sap; say from the first of April till the first of July. Wounds inflicted on trees at this season, commence immediately the process of healing, the wood appearing predisposed to retain life and soundness, up to the wound; whilst late in the fall and winter, wounds inflicted, become dead and dry to a very considerable depth, and and probably incipient putrefaction commences, before the process of healing begins. It may possibly be as well to prune later in the summer than the first of July; but I am inclined to the opinion that it is not. Pruning can be more conveniently done in winter.—Cuts or wounds in the sides of trees or limbs, having any considerable extent of branches above the wounds, heal more rapidly late in summer and in autumn than in spring; the case is different where the branch is severed entirely from the tree, which being done in the season of active ascending vegetation, will very soon show a ring of tender new bark, forming round the upper end of the limb where it is cut off, attempting to close in the wound.

I have seen most beneficial effects from wash-

ing fruit trees well with strong lie made from wood ashes, from pasting the bodies and limbs, as high up as can be conveniently done, with loblolly of wood ashes and water, and by white washing them in like manner with lime—the two latter of which applications, will commonly prevent hares from biting the trees.

CHARLES WOODSON.

REMARKS ON THE WOODSON AND CUNNINGHAM GRAPES.

To the Editor of the Farmers' Register.

Prince Edward County.

I will give you the history of the Woodson and Cunningham grapes* as they have fallen under my own observation, and the account from others of the discovery, with my opinion of their origin, properties, value, &c. The Woodson grape is one variety of a common, though not plentiful species, of indigenous grapes, growing wild in this part of the State, which I have seen occasionally from north of James River near Goochland Court House, to the southern part of this county, bordering on the middle and northern part of Charlotte, over a space of say 60 miles. The vine, leaf, and manner of its growth, are almost identical with the common black highland wild grape—the fruit about twice as large, the bunches considerably larger—the color of the fruit a brick-dust red, or bright brown, very nearly that of the Bland grape, but in which alone consists any striking resemblance between those two species. I consider it the most delicious variety of its particular species, the greater number of which are very sour. It is what I call a very fine eating fruit. Its great value consists in its heavy and almost unfailling production, having raised it and had it in bearing 26 years, without ever failing to have a tolerable crop in the time: generally the crops have been abundant. One year the fruit was all very imperfectly ripened and sour—another year about one-third of the vines did not perfect their fruit—this year the late frosts killed all the spring growth of blossoms and branches, and the second growth of branches have a thin crop of grapes which it is probable will not ripen perfectly before frost, as it is one of the latest kind of grapes. The first vine I ever raised of the kind, was grafted on a thrifty bearing vine of common wild grape, in the year 1807. The next year it bore a bushel basket full of bunches that were gathered at one time, besides a few that had been eaten at the vine. It has borne good crops, generally very heavy crops, every year but one since that time. The year it failed, I had great plenty on other vines of the kind. The best wine made in Virginia, which I have ever tasted, was the produce of this kind of grapes. In color and flavor, the wine approached nearer to Madeira than any I have met with. Its fruit is very sour and worthless, raised in cold or moist situations. Southern exposure and warm dry land suit it best. It is one of the most hardy and rigorous vines. I have never succeeded in raising it from cuttings, but by grafting; though Mr. Samuel W. Venable of this county has succeeded well. I have followed his

instructions strictly, and uniformly failed, so I consider it unsafe to rely upon that mode of raising it. If a vine can be procured to live and grow from grafting, which is tolerably certain, or by planting vines with roots, it may be conveniently enough propagated by layers: to do which, a portion of the growing vine being fastened down on the ground, should be lightly covered with rich earth at the joints, leaving the tops of all the branches uncovered. If very lightly covered with earth, they generally take root readily. Too thick covering prevents the rooting kindly, and is liable to make the vines decay. The parent vine was found growing wild on the plantation of Henry Caldwell, (now Mr. Isaac Reid's) in what we call a hedge row or site of an old fence, near the top of a south hill-side, a small distance north of Fort Creek about a mile or less from its junction with Buffalo River and Falling Creek, say five miles North West from Prince Edward Court-House. James Caldwell, son of Henry, gave me the first account of it in the year 1794, when he told me it had been known for a number of years to the family, who did not chose to show it to other people. Henry Caldwell was an old settler there, and I should suppose the vine to be older than any Bland grape vine that ever was raised in this county. I never found it till 1806, since which time it has been twice torn down from the trees by mischievous people, to get the fruit, and has been cut off at the ground. Its present top is of recent growth. I have met with only two other very good varieties of this species, both of which are in some respects inferior to this kind.

The Cunningham grape is quite a new kind. The parent vine, though now large, is but young. It sprang up in a corner of Mr. Jacob Cunningham's garden, and is (to almost a moral certainty) a descendant of the Bland grape, which had been raised there for many years. In all its most striking qualities and appearance, it resembles the Bland. The fruit ripens near the same time, is of the same color, not quite half the size, by actual weight, differs considerably in taste, and by some people is preferred. It is a stronger and more vigorous vine, and stands the rigor of our winters better than the Bland, which though seldom killed by our winter frosts, is frequently very much injured. It is of large growth, the leaves and bark being nearly identical with the Bland. In 1825 I first saw it, a very small bearing vine with extensive top: 1826 it grew astonishingly. In March of that year, I had some slips of it grafted on a vigorous young native grape vine in my garden—suffering part of it to run up on a stake, two other branches were extended on the ground in different directions, and covered at intervals with earth. It took root very kindly and its opposite ends are 40 yards apart. It could have been extended much farther in the time. I think it a certain, and tolerably plentiful bearer, and it is thought by an intelligent Virginian, who has resided many years in the wine county in the south of France, that it would be a superior wine grape. I have neither knowledge nor information on this subject.

CHARLES WOODSON.

MATERNAL TENDERNES IN A SPARROW.

A sparrow, which had built her nest on the thatch roof of a house, was observed to continue

* An account of these grapes from another hand, was given page 89, vol. 1. Farmers' Register. E. D.

her regular visits long after the time when the young birds had taken their flight. This unusual circumstance continued throughout the year; and in the winter, a gentleman who had all along observed her, determined on investigating its cause. He therefore mounted a ladder, and found one of the young ones detained a prisoner, by means of a string of worsted, which formed part of the nest, having become accidentally twisted round its leg. Being thus incapacitated from procuring its own subsistence, it had been fed and sustained by the continued exertions of its mother.—*Raleigh Register.*

THE FENCE LAW IN VIRGINIA.

To the Editor of the Farmers' Register.

It is most lamentably true that the energies of agriculture are crippled, and partially paralyzed by legislative enactment—by the measures of our representatives, from whom we might expect protection. But they give us such "protection as eagles give to lambs, covering and devouring them;" and I am almost induced to say, if the laws passed on this subject were unlegislated it would be most wise legislation. I particularly allude to that law which renders it imperative on every farmer to keep his fields enclosed, or it is lawful for every kind of stock to depredate and fatten on his hard earnings. This is the heaviest tax we bear: and I think upon a mature examination of the subject, the universal cry will be "relieve us from this oppression." Let the subject be fairly brought to the examination of every mind—let the trammels of precedent and the mists of prejudice be banished—let the rays of truth and justice beam upon the subject, and we fear not the result. I would gladly see the Register become the arena in which the friends and opponents of the fence law would display their prowess. We are seeking after truth, we want facts, circumstances, or arguments in all their force to be produced to prove the necessity of a continuation of this system in a country so long settled as Eastern Virginia. Its evils have been declared, the reasons why it should be abolished have been ably sustained by some of your correspondents. The arguments remain yet unanswered. Shall silence on this subject be construed into a tacit acknowledgement that the system is indefensible and untenable? If so, let there be one simultaneous movement among the people—let us petition the next legislature for a redress of our grievances, a relief from the onerous load we bear—let petition follow petition until the table in the legislative hall shall groan beneath the weight of our grievances, and the walls themselves echo back our wrongs. If the present legislature like precedent ones, remain dead to the interests of agriculture, the people at the April elections will have the subject in their own hands, when they can make a proper disposition of it. It was not my intention to discuss the merits of the question, but endeavor to excite others to it, who have abilities adequate, nay even superior to the occasion. I sincerely hope that many able and talented advocates may rally around the standard of opposition that has been raised. Every principle of justice, economy, charity, good feeling towards the suffering beasts, require of our hands an abandonment of this system. The peace of neighborhoods, the neglected

and suffering necessities of the widow and the orphan demand it. We fondly hope some of the valorous knights "whose evening thoughts and morning dreams are of kings, queens, and knaves," (for we are told such things are all the fashion at Richmond) will forsake the society of this royal fraternity, and give the subject a calm and deliberate investigation. Here is a new theatre for action—here honorable ambition would receive a rich reward—the gratitude of an intelligent, suffering community. How long shall agriculture hang her harp upon the willow? How long shall she chant her dolorous notes to the passing breeze? Let but the agricultural community rise in the majesty of their strength, and her redemption draweth nigh, and her delivery is at hand.

VIRGINIUS.

Prince George, Aug. 5, 1834.

THE VALUE OF LIME AS MANURE IN PENNSYLVANIA.

To the Editor of the Farmers' Register.

Charles City County, July 22, 1834.

I send you herewith enclosed, an extract of a letter written by a friend, in answer to some inquiries made by myself with a view to obtaining correct information on the use of lime as a manure in Pennsylvania; and the mode of farming, rotation of crops, &c. Should you deem them worthy a place in your paper, or as adding any thing to the interests of agriculture, they are at your service.

COLLIER H. MINGE.

In Virginia, the object of farmers is grain—in Pennsylvania, grass and grazing. Your courses of crops in Virginia succeed each other every three years—in Pennsylvania every six or seven years. By feeding cattle we improve our land—by ploughing, we reduce it. There is no land of mine that would stand your mode of cropping—which causes me to think that your land must be of the first quality, if properly managed. The use of the plough I admit, but object to the abuse of it, which is when you plough up more land than you manure, to gain five per cent. on the quantity ploughed up.

But to answer your inquiries. My farm east of the turnpike road contained 100 acres, of which about 85 was cleared land. This, when I purchased it, would not have produced more than fifteen bushels of corn per acre. If I should now say that it would produce forty-five bushels per acre, I think myself as near the truth as fifteen bushels when first purchased. Now for the mode of improvement. Lime was my dependence. In the first place, fifty bushels per acre was applied on the grass, to lie over the winter, or to be ploughed up in the fall for corn. In the spring before planting, fifty bushels more on the other side, making one hundred bushels of lime per acre. Now this field will be sowed in oats or barley. I now view my manure, to see how far it will go to give twenty bushels of wheat per acre in a fair season: if it will not go over the whole, I sow the remainder with grass seeds, like the rest, (clover and timothy) say four quarts of timothy, and six quarts of clover per acre. This land remains in grass until the remainder of the cleared land is all

limed at the rate of sixty or one hundred bushels per acre, and cultivated in the same manner. I now come to the place of beginning, when fifty bushels more of lime is added—the rule the same as above, respecting manure and grass seeds. I proceed on in this way until two hundred bushels of lime per acre, are on. This tract of land which I have just described to you, I graze—and cultivate only as much as will pay the laboring expenses. It has fed for five years past thirty head of cattle, of six hundred pounds weight, which has given twenty-two dollars per head. All the corn and oats that are raised on it are fed away to the cattle, and thus the manure is made very valuable. This method of feeding my offal grain is the same on the farm I live on. I sell my wheat and barley, and dispose of the other with my cattle, which in common I think the best market I can get.

I will now pass on to my experiment of improving land with lime alone, without the assistance of manure. I purchased a lot of land containing thirty acres, twenty of which was cleared, and had been thrown open as a common for some years, not worth making one hundred and fifty rails to enclose it, which with the rails on it made a reasonable fence. To test the quality of this land I had five acres ploughed and planted with corn. It did not produce me five bushels of good corn per acre. It being one mile and a half from my farm, no manure was drawn to it except about four bushels, to put in a gully to stop its washing. I sowed these five acres in oats and clover seed, but they were like the corn, not worth half the labor bestowed on them. I now commenced and put on the twenty acres one thousand bushels of lime, suffering it to lie on the surface four years. I put on it occasionally sheep, calves, &c. The fifth year I layed on one thousand bushels more lime, making one hundred to the acre, all lying on the top of the ground. This was not fair play: it should have been ploughed each time, and well mixed. The seventh year I was applied to by a farmer convenient, to cultivate it on shares; he voluntarily offered me one-half the produce, delivered on my home farm. The produce was thirty-three bushels per acre, in corn. It was now sowed in oats, and produced forty bushels. With the oats, clover seed and timothy were sown, as usual. It was now pastured four or five summers, and one thousand bushels more lime was added, making one hundred and fifty bushels per acre. I now cultivated it myself, and the produce was forty-five bushels per acre in corn—oats and clover seed following: four years after this ploughing I laid on one thousand bushels more lime, making two hundred bushels per acre.

First cost per acre,	-	-	-	\$14
Two hundred bushels lime at 16½ cents,				33
And two tons plaster at \$10 per ton,				20

This land has given me for the last five years good six per cent. interest on the whole cost per acre.

In this experiment I have varied from my horse method of farming, in respect to feeding my grain on the land. Not one bushel of grain was fed on it. One crop of corn was husked on the stalks, and cattle turned in to eat the remainder; the stalks were all drawn off as was all oat straw made. Thus the oats and corn now taken off

amount to more than one hundred bushels per acre.

I saw your account of marling expenses—you can improve your land much cheaper than I can if your marl is as desirable as that specimen I gave you.* It must be fifteen years since I had some of that drawn out, and its good effects now are as plain as they were the first year.

GAMA GRASS.

To the Editor of the Farmers' Register.

Scottsburg, Halifax, Aug. 10, 1834.

The following observations upon the gama grass, are necessarily unsatisfactory and imperfect; but they may possibly throw some additional light upon a subject which has excited considerable interest. I am fully sensible that years of careful observation and extended experiment can alone satisfy the public mind about a matter of this sort. My object is simply to show the productive capacity of this grass, and to point out a few facts with regard to its habits and character, which may be of use in facilitating proposed experiments.

It is already known that gama grass is found upon the alluvial lands of the Roanoke, and its tributaries. The description given of it in the fourth number of the Farmers' Register, enabled me to recognize it upon the Dan. I have known it for many years, and have frequently been attracted by its luxuriance, but have hitherto looked upon it as one of the numerous species of flag in which our lands abound. Upon further investigation, I have been enabled to correct this opinion, and to record the following facts.

It vegetates readily upon every variety of soil, but with very different degrees of luxuriance. Upon lean stiff lands, for instance, the blades never exceed twelve inches in length; and I have seen spots of it upon very sterile land where its greatest altitude was only a few inches. On the other hand, upon light sandy loams the blades will generally measure five feet in full growth, and the flower stems will occasionally reach an altitude of nine feet. It is evidently a species of maize, and to this circumstance it probably owes its name of "corn grass," and its value as provender. The grain possesses a pleasant farinaceous flavor, undistinguishable from that of Indian corn. When extracted from the horny substance in which it is imbedded, it is found protected by several thin laminae, similar to those in which a grain of wheat is encased. It is a little smaller than the latter grain, and of a conical shape. There is a soft pulpy substance running from the apex to the base, corresponding in taste and color to the heart of a grain of corn.

Twenty bunches of this grass cut about the last of June, were found to weigh 107 lbs. green, making an average of five pounds to the bunch. The diameters of these bunches were generally about eighteen inches. Very few of them reached two feet. The flower stems were numerous and constituted three-quarters of the weight. The stems and blades however were consumed by animals with equal avidity.

It does not flourish upon "water sobbed," or marsh lands, however fertile. Or where it is in-

*This specimen contained 60 per cent. of carbonate of lime.

commoded by grass or weeds of any description. Indeed it seems almost as easily affected by these circumstances as Indian corn. On lands in fine tilth and unobstructed by other vegetation, the product of these bunches were from seven to nine pounds green hay. Nothing can exceed the rapidity with which it vegetates. It grew eight inches in six days after the first cuttings, and in twenty days the blades generally measured two and a half feet. From various experiments, I consider that one pound of green hay to the square foot is the ordinary product. In one instance sixteen pounds were obtained from a closely matted area of as many square feet. Upon a soil equal perhaps to the production of two and a half barrels of corn to the acre.

No satisfactory experiments were made to test the weight of the cured hay. At least they were confined to a few bunches only. I consider however two-thirds an ample allowance for all loss in the process of curing. I have avoided making any calculation from the facts given above, because I still feel a degree of incredulity about the matter, which nothing but time and extended experiment can effectually remove. Those who have more faith in figures may be easily convinced that ninety ton of green grass to the acre is a moderate allowance.

I must not omit to state an experiment I made in planting. Two acres of land were selected similar to that upon which I found it growing with luxuriance. It was laid off by Mr. Meares' direction, and planted by slightly covering small portions of the root. The result was very unhappy: a great portion never after saw the light—and what did come up was smothered by the weeds. There were however a few bunches planted with the tops above ground: these were once worked, and are now flourishing. Were I to repeat the experiment I should make use of larger sets, and leave their tops exposed. The land should be regularly cultivated until the extension of the roots forbid the introduction of the hoe or plough. This I am well convinced is the only way of cultivating it to advantage.

The process of curing gama hay is simple. Two days exposure to the sun is sufficient. It may then be thrown into shocks with safety. In this situation it will withstand weather which would destroy clover hay. This I know from observation, and it is owing to the structure of the blade which by a little care in arranging renders the interior of the stack or shock impervious to rain.

I have used several hundred weight of this hay during the summer, and have generally found it preferred to clover or herd's grass. But whether it could be substituted with profit for these long established grasses, I am unable to decide. This much however may be said in favor of clover and red-top, that where lands are cheap and continually deteriorating as they are in Eastern Virginia, they constitute the cheapest means of restoring them to fertility, and at the same time afford an abundant supply of provender. It is of little consequence under such circumstances, whether our hay is reaped from one or five acres: the additional labor is the only difference, and that is scarcely worth calculating. As far as improvement is concerned, the fine turf and rich herbage of clover and herd's grass are in my humble opinion, of in-

calculable more importance to the interests of agriculture than gama grass and its hundred tons to the acre.

It may be said that the cultivation of all of these grasses at the same time is not incompatible. We doubt it. The introduction of gama grass would eventually banish the others, by giving fresh impetus to the ruinous system hitherto followed in many parts of Virginia, of extending the surface of cultivation without any regard to improvement. On the other hand, clover and red-top insure a compulsory reformation of this system, by confining our operations to a smaller space, and giving more leisure for enriching these contracted scenes, whilst the rest of the farm is gradually undergoing the enriching effects of luxuriant herbage.

HENRY E. SCOTT.

THE PROFITS OF THE DAIRY COMPARED WITH THAT OF FATTENING ANIMALS.

From the Genesee Farmer.

"It has been stated on the authority of the Board of Agriculture, and upon incontrovertible data, which any farmer or cow feeder may ascertain for his own satisfaction, that the quantity of herbage that will add 112 lbs. to the weight of an ox, will, when bestowed on a dairy cow, of ordinary good breed, and in fair condition to yield milk, enable her to yield about 2700 imperial pints of milk. And, as it is well known that, even in Scotland, where milk often contains more cream than that of cows fed on richer pasture; yet, in general, 17 pints of milk will yield an imperial pound of butter; and the buttermilk will sell at 1d. the three pints; and, as 120 pints of that milk will yield from 16 lbs. to 17 lbs. averdupois, of full milk or Dunlop cheese, it is easy to ascertain whether the 112 lbs. of beef, or these quantities of butter and buttermilk, or of cheese, will realize the greatest sum. The 2700 pints of milk will yield nearly 385 lbs. or 27½ stones imperial of full milk cheese; and, if made into butter, they will give nearly 157½ lbs. besides the buttermilk, which would about amount to half the quantity of milk churned. The average price of beef, for seven years past, has not exceeded 6s. per English stone; and the 112 lbs. of course amounts to £2 8s., while 27½ stones of cheese, at 5s. per stone, the average price paid by the merchant to the farmer, during the last seven years, amounts to £6 17s. 6d.; and the average price of 157 lbs. butter, at 8d. per lb. for the same period, amounts to £5 5s., and the buttermilk to £1 17s. 6d. more, or both to £7 2s. 6d.; so that the average price of the cheese exceeds that of the beef to the amount of £4 9s. 6d.; and the butter and buttermilk give £4 14s. 6d. more than the beef, produced from the same quantity of food to the cattle."

The above extract is from the Quarterly Journal of Agriculture for March, and was promised some weeks ago. Let us apply its leading facts to our market. We will assume, that the price of beef in our large towns is upon an average \$5 per cwt., of butter 16 cents per lb., and of full milk cheese 7 cents. The result would be this:

112 lbs. of beef, at 5 cents,	\$5 60
380 lbs. of cheese, at 7 cents,	26 60
157 lbs. of butter, at 16 cents,	24 12

These facts, at all events, are worthy the consideration of cattle farmers.

ON ASHES AS A MANURE.

From the Genesee Farmer.

From a letter just received from a correspondent in Pennsylvania, we make the following extracts. We are aware that many of our Genesee farmers consider the use of ashes as a manure at least doubtful,—ascribing its supposed inefficacy to some peculiarity either in our soil or climate; but we have not been disposed to adopt this opinion. In fields which yield large crops, the difference of a few bushels to the acre, is scarcely perceptible; and it follows that the value of a manure which produces such difference, may be much under-rated. Yet it is evident that five bushels of Indian corn, added to the forty or fifty bushels which the land would produce without manure, are worth as much to the farmer, as when that addition is made to the product of more sterile lands; or when it increases the crop from twenty to twenty-five bushels an acre.

We want experiments in the western parts of this state, on the subject of ashes as a manure. We believe that farmers, instead of selling unleached ashes at their doors for six cents a bushel, would find it more profitable to keep them for their own use, and to apply them to their own corn fields as manure.

"I put a small handful of unleached ashes into each hill of corn at the time of planting; and I think this way is better than to put it on the hill after the corn has come up. Last season, I dressed a few rows of corn with it, and am satisfied it is fully worth seventy-five cents a bushel for this purpose. These rows alternated with others, so that the experiment was fairly tried; and the difference was apparent through the whole season. There was a gain of at least five bushels to the acre. The ashes cost fifteen cents a bushel, the quantity not exceeding three bushels to the acre.

"This year, I bought potash for soap making, so that I might save my ashes for manure, *unleached*. I am satisfied that *leached* ashes are not worth near so much; yet with the latter, the corn was much better than in that part of the field which had no ashes."

PROCESS OF MANUFACTURING INDIGO IN SMALL QUANTITIES FOR FAMILY USE.

By Mrs. N——, of North Carolina.

From the Southern Agriculturist.

Mr. Editor,—Cut the Indigo when the under leaves begin to dry, and while the dew is on them in the morning, put them in a barrel, fill it with rain water, put weights on it to keep it under water; when bubbles begin to form on the top, and the water begins to look of a reddish color, it is soaked enough, and must be taken out, taking care to wring and squeeze the leaves well, so as to obtain all the strength of the plant; it must then be churned (which may be done by means of a tolerable open basket, with a handle raising it up and down) until the liquor is quite in a foam, you must try when it is done enough, by taking out a spoonful in a plate, and putting a small quantity of *very strong lie* to it. If it curdles, the indigo is churned enough, and you must proceed to break the liquor in the barrel in the same way, by putting in lie, which must be as strong as possible, by small quantities, and continuing to churn, until

it is all sufficiently curdled; care must be taken not to put in too much lie, as that will spoil it. When it curdles well with the lie, it must be sprinkled well over the top with oil, which immediately causes the foam to subside, after which it must stand till the indigo settles to the bottom of the barrel, which may be discovered by the appearance of the water, which must be let off gradually, by boring holes first near the top, afterwards lower, as it continues to settle; when the water is all let off, and nothing remains but the mud, take that and put it in a bag, (flannel is the best) and hang it up to drip, afterwards spread it to dry on large dishes.

Take care that none of the foam, which is the strength of the weed, escapes; but if it rises too high, sprinkle oil on it.

ON THE SELECTION OF SOILS FOR A VINEYARD.

Hancock County, (Geo.) July, 1834.

From the Southern Agriculturist.

Mr. Editor,—Six or eight years ago, a desire to cultivate the vine, seemed to be spreading so extensively through South Carolina and Georgia, that by this time it was expected we should have, if not abundant supplies of good domestic wine, at least such reports of progress as would furnish valuable directions to adventurers of the present day. For such reports I have looked in vain to the pages of your useful repository, and other accessible sources of information. It was never probable, that every vine planted would succeed well, because too little was known in this country of the culture, eligibility of soils, or variety of the vine to be planted. Except Mr. Geiger, Mr. Herbmont, and a few others in Carolina, and perhaps about the same number in Georgia, I have heard of no experimenter, whose achievements in wine-making, can be regarded as at all encouraging. Every one has raised vines, which in the spring season, give fair promise of fruit; but unluckily before vintage, mildew, rot, or some other form of malady, seems, in most instances, to have destroyed most or all of the crop. Such, at least, has been the fate of mine, and several other small vineyards within the range of my observation, though I have remarked a few notable exceptions.

A knowledge of the causes of failure and of success is in great demand by all who think of prosecuting this interesting branch of cultivation; and this cannot, so certainly and conveniently be had, in any other way as by detailed accounts of experiments, setting forth the mode of planting the vines, the kind of earth in which they may have grown—whether clay, sand, or loam predominates—the name of the vines, method of tillage and training, together with the experimenter's own remarks on the subject. It is in the hope of drawing from some of the readers and patrons of the *Agriculturist*, that I ask the publication of this article.

It has been said, I know, that an annual excision of the superficial roots of the vine, so as to force the plant to subside and propagate fruit, by the roots more deeply rooted beneath the surface, would be found a security from mildew and rot. This mode of treating vines is often practised in this country, and possibly with beneficial effects.

Mine, however, which grow thriftily in a deep sand have not matured one half the fruit.

It has also been said, that sandy and rather poor land produces more perfect and richer berries than soil of greater fertility, and more largely mixed with clay. This, too, is contradicted by my observation. By far the most thrifty and valuable vineyard, I ever saw, comprising six or eight varieties of the grape, on about seven acres, is now cultivated in the county of Jasper, (Georgia) on a high hill of pretty rich red clay and very stony. I saw it last July in full bearing, the fruit just beginning to ripen, and not a berry diseased, except a few Isabellas, and, perhaps, one other variety, the name not now remembered. The excessive wet weather of last spring was fatal to grapes growing on sandy soils; yet the vineyard in Jasper, on red clay, was never more prolific, yielding, as I understand, between one and two thousand gallons of wine, which the skilful and fortunate cultivator, Col. Alexander, sells readily at from one and an half to two and an half dollars a gallon, when above one year old. But this was not the only instance of pretty uniformly good crops being produced on rich red clay lands.

What time may do for vines which grow on poor and sandy land, our brief experience in the culture of the article has not yet shown—such lands, I know, are recommended by most European writers; yet it is well known that in a state of nature, it is our rich woodlands only that produce our thrichest vines and the richest fruit. The experience of Europe may be different, or as has been often stated, and yet no safe guide in this respect to the American adventurer.

The most productive vines I ever saw, is the mother of that family of excellent grapes, known as the "Devereux grape." It stands in my neighborhood, is now thirty years old or upwards, and has been trained on arbors to the length of one hundred feet or more—never much pruned—produces a good crop every year, and grows in soil almost as rich as manure can make it. I have a number of thrifty vines of the Devereux grape in a vineyard of rather poor sandy land, which have not perfected fruit oftener than one year in three since they began to bear—they may do better when older; but from the facts that have fallen under my notice, I would, for the location of a vineyard, select the richest red clay of suitable elevation that I could find. Long spells of rain, will, I fear, ruin the fruit of any vines in this country which grow on beds of deep sand—unless, indeed, such consequences may be averted by copious applications of manure.

HIGHLANDER.

OBSERVATIONS ON THE RED LANDS OF THE SOUTH WEST MOUNTAINS.

To the Editor of the Farmers' Register.

I observed in looking over the September number of the Farmers' Register, in an article signed "A Gleaner," a notice of horizontal ploughing, as adopted in Albemarle, and as he supposes now abandoned. It certainly is abandoned in the breaking up of land, but not in the culture of the corn—the crop being planted, or attempted to be planted, in horizontal drills very generally laid off by the eye. It is true that the eye of every ploughman is not as accurate as that of a gentle-

man who had discovered that water would run up hill, (for you must know he had the most accurate eye in the world, and he had discovered by it that water had run from a lower to a higher point)—but sufficiently accurate for practical purposes, to keep the water dispersed, and prevent wide breaches through the field. In breaking the land with the large plough, the old system of beds both straight and horizontal are disused, for the more expeditious and efficacious spiral method; that is going round the base of the hill and terminating at the top. The mould-board being kept always from the hill, the earth is moved a smaller distance, and tumbling over more, leaves a freer and wider furrow. The growing practice of cultivating corn, on turf, or clover, and the disuse of the small plough and coulter, (depending exclusively upon the superficial work of the cultivator, and trusting to the decomposition of the vegetable matter to mellow the land, which is more permanent and effectual than the plough or coulter, better for land and crop,) will lead to the entire disuse of the horizontal ploughing, except upon stubble or clear land, or for the relief of teams on very broken fields. It may well be doubted whether horizontal ploughing would be useful upon lands less permeable to water than the red lands of the South West Mountains. They are so, in a very remarkable degree—and if the water can be arrested for a moment it goes into the earth. It is a friable clay, without sand; its aperient, is a round iron ore from the size of the point of a pin to a partridge shot, rolling when it comes in contact with the plough, which never cleans itself unless the land is perfectly dry. It is adhesive in a high degree when wet, yet not cohesive except when dry; adhering to your feet most inconveniently, yet not cohering sufficiently unless hard trod, or turfed, to be turned over by the plough; but shoving aside like dry sand. The clay breaks in cubical fractures. These after lying tempered in brick mortar forty-five hours, moulded and remaining until the brick has acquired consistence enough to bear handling, will be found to be dry when taken from the centre of the moist brick, having resisted the action of the water. When ploughed in the fall it is acted on by frost, and becomes very light. A hare may be tracked across a field as through snow. Light enough almost to be blown by the winds, yet this is the condition in which it will not wash. The writer of this article recollects to have had a very steep field in the shape of a half funnel, in this condition in the winter of 1822-3, exposed to a rain of nine inches and a quarter, falling in about fifteen or eighteen hours, without the slightest washing, except where the water burst out of the earth and run a few feet before it disappeared. A very small portion reduces to an impalpable powder; yet that is so minute as to penetrate the best made new boot. It exhibits no appearance upon the surface of being dissolved by water. Clover seed falling into holes, is found after a rain not imbedded in a clay or soil deposited by water, but clear and distinct upon the surface, as if the water had held none in solution. A thin crust forms on the surface in spring (which does not crack in drying) sufficiently hard to cause clover seed to lie on it as a rock, and perish; or should a root perchance penetrate, it enters a loose coarse soil, badly adapted to its vegetation; hence it is, without the roller, precarious in the extreme for a crop of young clover;

yet when it gets hold, no land produces more vigorously or is more improved by it. Vegetable matter corrects many of its defects. It pays well him who cultivates well—it starves him who cultivates badly. A crop is never drowned by wet. No land stands drought better. It washes as little under good culture as any land—as much under bad. Grass was not indigenous, except a few late summer grasses and coarse weeds. You now find the clover, the sassafras and the brier, struggling for the mastery—the clover taking it the first crop, the sassafras and brier the second. It was originally very fertile, and tempted at an early period capitalists, who desolated it with their tobacco, their overseers, and their negroes. The first step at reclamation with many has been achieved; the surface is smoothed, and again produces vegetation; but the most advanced are far from a maximum. It will be a rich district. The energies of the soil when properly developed, are of the most vigorous character.

Lands more soluble in water, acquire a compactness under the action of hasty rain, which cause them to admit the water more slowly. Your horizontal furrows fill to overflowing—one breaks over into the one beneath it—that into a third—thus the water becomes embodied, and produces the evil you desired to arrest. The red land of the South West Mountain if ploughed so deep that the water cannot float, the whole surface admit it like a sieve, and it passes off into a substratum two or three feet below, as is proven by roads worn on hill-sides, which no matter how elevated, invariably become springy in wet weather.

Your correspondent quotes a passage from Arator, viz: "hilly lands will admit of narrow ridges as well as level, by a degree of skill and attention so easily attainable, that I observed it to have existed in Scotland above a century past, under a state of agriculture otherwise execrable, and among the ignorant highlanders." Did the author of Arator intend to convey the idea that horizontal ploughing existed in Scotland a century ago? Lord Kaimes (I quote from memory, not having a copy of the work, and therefore cannot give his words) in speaking of this crooked ploughing of Scotland, does not call it horizontal, but speaks of it as without object, resembling the uncertain zig-zags of an animal walking uncontrolled through a field. This expression could not have been used where crooked beds were designed for a particular object. Arator has certainly fallen into an error on this subject.

The rain being over, and my horses done eating, Mr. Editor, I must take my leave of you. Don't be surprised that one who follows the plough daily should quote Lord Kaimes to you. It is not always the case that those who have most leisure, have most learning.

A FURROW TURNER.

EXPERIMENTS ON GAMA GRASS.

For the Farmers' Register.

Among the different experiments I have made for the purpose of ascertaining fully and correctly, the various modes in which the *gama grass* may be advantageously used in feeding cattle, and for which purpose it seems to me admirably calculated, I have been much gratified with one, on

which I stumbled, and the result of which may be worth communicating.

Having been in early life much accustomed to, and a close observer of Pennsylvania farming, I was much pleased with the German economy of increasing forage for their cattle, by the aid of art, in *mixing* food—they being assured that the process adds to the capacity of each ingredient, for furnishing nutritive properties.

This theory they put in practice throughout many parts of the state, in their mode of putting up *green clover*, as a forage for milch cows during the winter; not only preserving, as they believe, in a superior manner the fine qualities of the clover, but augmenting equally the quantity of forage. As fast as the clover is cut, they stack it, mixing equal quantities of well preserved straw, and a small portion of *salt*, sprinkled regularly over the clover as the layers are completed. The gratification with which the cattle appear to feed on this preparation throughout the winter, I early noticed, especially when it was cut up in the box, and served out to them in troughs—one tin pint cup full of rye, or Indian meal, seasoning the food of a day, when confined to their stalls.

I once had the pleasure of witnessing an experiment made by an intelligent German farmer, to ascertain the advantage of steaming this preparation, before feeding, and was much pleased with the result. The milk evidently was increased twenty-five per cent., and the capacity of the food for giving out its nutritive qualities, almost the same.

A recollection of this fact induced me to endeavor to imitate the course of the intelligent German; and commencing the last July, I built up a considerable stack, of equal quantities of *gama grass* and *wheat straw*, in thin layers, taking the grass from the scythe, and on each layer of grass, as I built my pile, sprinkling a little salt (ground alum);—straw; then grass and salt. The straw was in a state of perfect preservation. The stack was built in the old Pennsylvania barrack fashion, a good thatched roof, moving up and down, as required, on fixed posts.

On the 1st of December, I found the preparation sweet and in fine preservation, and commenced feeding four favorite milch cows, in a trough, under an open shed in my "dung stead." This shed was protected on the north and west. The preparation I cut up in a patent cutting box, to about one inch—this was the work of *rainy days*, two hands cutting several hundred bushels per day; as cut, it was packed closely away in a small apartment in my cutting room, to be used as required. On taking the cover from the stack, or barrack, it gave out a fine flavor, resembling that discoverable on opening a stack of well preserved corn blades. This I wished to preserve as much as possible, believing it to add to the gratification of the animals while eating it, for I found that after my cattle were accustomed to the preparation, on going up to a bundle of *straw*, they would smell it strongly, and immediately go in search of another, but never leave that one mingled with the grass.

In the morning, previously ascertaining the quantity requisite to feed on to 12 o'clock, I put it in the troughs, sprinkling it with a liquid (I kept always ready by having two casks) composed of water and corn meal, in which the vinous fermea-

tation was completed, and the acetous slightly commenced. The result of this feeding, whether as regards economy, or success in supporting cattle in good plight, I am fully satisfied with, and I beg leave to suggest the trial to all those who are now cultivating this grass.

I took the wheat straw intentionally, knowing that straw was held in the least estimation by cattle raisers—I shall hereafter subject all my straw to the same process. I made a little of the preparation with rice straw, a grain we raise with admirable success, on even our pine lands—and some with rye and oat straw. These three last, I found my mules eat voraciously, and to eat which, my best fed horses appeared 'nothing loath,' especially that in which the oat straw was combined.

For all my dry cattle, work steers, mules, and horses, I shall cut the grass hereafter, at *one month's growth*, say seven cuttings during the season.

I have occasionally observed, that some gentlemen feel doubtful, in spite of the hundred testimonies that have been given to the public, respecting the astonishing productiveness of this grass. Having it in a fine state of cultivation, on *pine land*, the soil about as well managed and manured, as a good Virginia farmer manures and manages his clover field, I will give the product of a part of a lot of it, during the last year, which was a favorable season with us.

I laid off a piece of ground, one hundred by fifty feet—the plants previously at two feet distance. Cut on the first day of May, and monthly, until the first day of November inclusive. The production averaged *ten and a half pounds* at each cutting, from each plant or root. In the month of June, I sprinkled rotted *cotton seed* over the ground—at each cutting loosened the ground between the plants with a narrow hoe. Previous to planting, I gave the ground a coat of lime.

AGRICOLA.

Clarke County, Alabama.

AGRICULTURAL SOCIETY FOR KING WILLIAM, AND KING AND QUEEN.

For the Farmers' Register.

At a meeting held agreeably to notice, at Aylett's, on the first of August, 1834, for the purpose of organizing an agricultural society for the counties of King William, and King and Queen—on motion, Dr. William B. Westmore was called to the chair, and Thomas Haynes appointed secretary.

1. *Resolved*, That a committee of thirty-one be appointed by the chairman to draft and report a constitution at our next meeting, which committee being appointed—on motion, the chairman was added to the committee.

2. *Resolved*, That some suitable person be appointed to deliver an address at this place, on the third Wednesday in October next, for the purpose of promoting the objects of this meeting.

3. *Resolved*, That Mr. John Gaines be appointed to deliver the address, and in case of his failure the chairman select some other person.

4. *Resolved*, That the secretary inform the absent members of the committee, appointed to draft a constitution, of their appointment, and earnestly solicit their co-operation.

5. *Resolved*, That Dr. William B. Westmore act as chairman of the committee.

6. *Resolved*, That a copy of the proceedings of this meeting be forwarded to the editor of the Farmers' Register, with a request for him to publish them.

On motion, This meeting ~~was~~ adjourned to meet on the third Wednesday in October next.

WILLIAM B. WESTMORE, chairman.

Thos. Haynes, sec'y.

AGRICULTURAL SOCIETY FOR BUCKINGHAM.

For the Farmers' Register.

At a meeting of a number of gentlemen at the house of Robert Shaw, esq., in the county of Buckingham, on the 29th of August, 1834; the object of which being the formation of an agricultural society—on motion of Dr. Wm. Moseley, Robert Shaw, esq. was called to the chair, and Wm. N. Patteson appointed secretary.

On motion of Col. Thomas M. Bondurant, resolved, that a committee of eight be appointed to prepare and submit to an adjourned meeting, a constitution for the government of said society: whereupon, the chair filled the blank with the names of the following gentlemen: Thomas M. Bondurant, Wm. Lewis, Wm. N. Patteson, Dr. Wm. C. Moseley, Dr. James M. Austin, George Moseley, P. H. Hickok and Dr. Wm. P. Moseley; and on motion, the chairman was also added to said committee.

On motion of Maj. George Moseley, resolved, that the members of this meeting constitute a committee, whose duty it shall be to make known to the citizens of this county, the object of this meeting, and to invite their attendance, and request their co-operation therein.

On motion, resolved, that when this meeting adjourn, it be to meet at this place on the 9th of September next.

On motion of Maj. James M. Patteson, resolved, that the foregoing proceedings be forwarded to the editors of the Richmond Whig, Richmond Enquirer, Virginia Advocate, and Farmers' Register, with a request that they publish the same in their respective papers.

On motion, resolved, that the proceedings of this meeting be signed by the chairman and secretary.

On motion of Wm. Lewis, esq., resolved, that this meeting adjourn.

ROBERT SHAW, chairman.

Wm. N. Patteson, secretary.

FIELD PEAS AFTER WHEAT.

To the Editor of the Farmers' Register.

King and Queen, Aug. 12, 1834.

Permit me to call your attention for a moment to a pleasing fact which has recently occurred on my farm. There is now on a part of my stubble field, from which wheat was taken the last week in June, a fine growth of pea vines (volunteers) which have sprung up since the wheat was taken off.

The land was cultivated in corn and peas last year, and at the proper time to seed wheat, say

about the 18th of October last, the corn was removed, (the peas having been previously gathered,) and the land laid down in wheat.

No doubt but that some of the peas were left on the land, ploughed under with the wheat, and remained in *statu quo* all the winter. I am now clearly of the opinion that it would be highly beneficial to our poor sandy soils, where clover will not take well, to sow one bushel of black eyed or Jefferson peas, per acre, at the time of seeding wheat, taking care not to commence, in order to prevent the peas *vegetating* at that season of the year, before frost, or cold weather. Indeed, with us, it is very unsafe generally to sow wheat sooner than the 15th of October; seeded earlier it is almost certain to be destroyed by the fly.

This system of improvement possesses several very important advantages. 1st. The expense will be only about sixty or seventy cents per acre. 2d. There is no extra fallow, harrowing, or labor of any kind—and 3d. The land is not at all exposed to the action of a hot sun, which must necessarily be the case where you fallow for a crop of buckwheat or peas. The *tory*, or *black pea* is admirably adapted to this system, for it will bear the most rigid exposure, and produces a most luxuriant cover of vines.

[The honorary Silver Medal having been offered as a premium for the best account of experiments made, to ascertain what advantage may be derived from plucking off the flowers of the potato, it was adjudged to the author of the following Report.]

REPORT OF AN EXPERIMENT MADE AT ABERDONA, TO ASCERTAIN THE BENEFIT RESULTING FROM THE REMOVAL OF POTATO-BLOSSOMS.

By Mr. JAMES MURRAY.

From the Prize Essays and Transactions of the Highland Society of Scotland, [March, 1834.]

The experiment was made according to the plan laid down by the Highland Society in their list of premiums for 1833.

The quality of the soil was not the best adapted for a very successful potato crop, but as I did not think of making the experiment until after the ground had been sown, I had no alternative left me. At the same time, I believe that an experiment of this nature, although made upon a crop raised in soil not peculiarly well adapted for its culture, will be quite as satisfactory in determining the advantages of it, as one made upon a more congenial soil. The soil consisted throughout the two acres upon which the potatoes had been sown, of a shallow loam, upon a bed of what is generally called till. The field had been well drained, but like every other field of the same nature of soil, (unless where Mr. Smith of Deanston's trenching plough may have been used,) continues in what may be called a cold, damp state, and therefore an enemy to the potato.

The variety of the potato sown, was one which had been brought from Ireland some years ago by a gentleman of this neighborhood, and is called the red potato in this neighborhood.

I divided the whole field into parts of *three* drills each, and having explained what I wished to be done to a few children of from nine to twelve

years old, previous to the appearance of any blossoms, they never allowed a day to elapse, without looking after their charge, and no sooner had a blossom begun to appear, (or in bud,) upon No. 1. of each part, than it was certain to be immediately plucked off. The other two drills of each part remained untouched until the blossoms upon No. 2. seemed to be fully expanded, when they were also plucked off, while No. 3. was allowed to ripen its fruit. By arranging the drills in this manner, I could depend on being more correct in having the soil of each of the drills of each part exactly similar than I could have been, had I divided the field in the manner proposed by the Society.

The preceding part of the experiment was (as it must appear to be) very simple indeed, and attended with no expense whatever, for there are always children in the neighborhood of a farm, who will do the work for a few pence a-day.

The most difficult part of the experiment to arrange, was the taking up of the crop, so that there might be no interference between the different drills. To obtain this, I took three carts, one of which was appropriated entirely by No. 1. of each part, another by No. 2. and the remaining one by No. 3. In this manner I prevented the very slightest mingling of the potatoes.

The quantity of potatoes which each cart held, was exactly ascertained, and the management of this part of the experiment being given to one person, it was his business to mark down how many loads each cart took to the potato-pit.

After the whole crop had been taken off the field, and the overseer's note-book examined, the following was the result:—

Drills, No. 1. being those from which the blossoms were plucked in the bud, contained 30 bolls 2 bushels.

Drills, No. 2. being those from which the blossoms were plucked when in full flower, contained 27 bolls 3 bushels.

Drills, No. 3. begin those upon which the fruit was allowed to ripen, contained 26 bolls.

The superiority, therefore, of No. 1. over No. 2, was 2 bolls 5 bushels; over No. 3, was 4 bolls 3 bushels; and of No. 2 over No. 3, was 1 boll 3 bushels.

From the above experiment it would appear, that the potato crop had been improved by having the blossoms plucked off, and that according to the period at which it had been done. At the same time, the difference is perhaps not much more than would be counterbalanced by the additional trouble given in taking up the crops; for, although regulated as well as possibly could be done, still it could not be taken up in nearly the time in which it would have been done, had the drills been resorted to indiscriminately.

The quality of the potato is remarkably good, it is of a mealy nature, and an uncommonly good keeper. We were using them last year here, in preference to early potatoes.

Aberdona, Alloa, November 1833.

GEOLOGICAL SURVEYS.

From the Southern Religious Telegraph.

By the following notices it appears that a new interest is awakened in respect to the geology of different portions of our country.

The legislature of the state of Tennessee, has appointed Dr. G. Troost, a distinguished naturalist, geologist of the state. He has already made a report in part, containing a geological survey of Davidson county.

Mr. G. W. Featherstonhaugh is at present engaged under the authority of the United States government, in investigating the geology and mineralogy of Arkansas territory. It is expected that he will report to congress in February next.

Mr. S. G. Clemson, who has recently returned from Europe, after a long and faithful apprenticeship in the school of mines at Paris, has accepted the appointment of the Geological Society of Pennsylvania, to visit and report on the gold region recently discovered in York county, Pa.

The legislature of Maryland have appointed Professor Ducatel and Mr. Anderson, of Baltimore, to make a geological and topographical survey of that state.

The Geological Society of Pennsylvania, have it in contemplation to appoint a committee of their members to make a geological survey of Schuylkill county for which purpose part of the necessary funds have already been subscribed.

[To the author of the following Report, the result of five years practical experience, the thanks of the Society and the honorary Silver Medal were voted by the Directors.]

REPORT ON THE VALUE OF BONE-MANURE, IN COMPARISON WITH ORDINARY FARM-YARD MANURE.

By the Honorable Captain W. OGILVY, Airlie Castle.

From the Prize Essays and Transactions of the Highland Society of Scotland.

Mr. Watson of Keilor introduced the use of bone-manure into Strathmore, having seen it used in England. I am not certain in what year he began to make experiments with it, or to employ it extensively, but I remember well that the great deficiency of farm-yard dung in 1827 (consequent on the almost total failure of the crop of the previous year) first induced me to try four acres of turnip without other manure, sown with 15 bushels of bone-dust per acre, which I obtained from Mr. Watson: it cost 3s. per bushel, or £2 5s. per acre. The crop of turnip on these four acres was at least equal to the rest raised with farm-yard manure; but as the whole of the turnips were pulled, and the land received some dung before the succeeding crop, much stress cannot be laid on the circumstance of the following white crop and grass being good.

Next year, 1828, encouraged by the former successful experiment, eight acres were sown with turnip, solely with bone-dust; the soil a light, sandy loam; the subsoil gravely and sand, coming in some places nearly to the surface, which is very irregular, but in general has a south exposure. This field had been broken up with a crop of oats in 1827, after having been depastured six years principally by sheep. The quantity of bone-dust given was 20 bushels per acre, and cost 2s. 6d. per bushel, or £2 10s. per acre. The turnip crop was so heavy, that, notwithstanding the very light nature of the soil, it was judged advisable to pull one-third for the feeding cattle, two drills pulled,

and four left to be eaten on the ground by sheep. The following year, 1829, these eight acres were sown with barley and grass-seeds, and the produce was 57 bolls 1 bushel, or 7 bolls 1 bushel nearly, per acre, of grain, equal in quality to the best in the Dundee market, both in weight and color. Next year, a fair crop of hay for that description of land was cut, about 150 stones an acre; and though I am now convinced that the field should rather have been depastured the first year, yet the pasture was better than it had ever been known before for the two following seasons, 1831 and 1832. It is worthy of remark, as a proof of the efficacy of the bone-manure, that in a small angle of this field, in which I had permitted a cottager to plant potatoes, well dunged, and which, after their removal, was included in one of the flakings of sheep, and had (one might have supposed) thereby had at least equal advantage with the adjacent bone-dust turnip-land, both the barley and grass crops were evidently inferior, and this continued to be observable until the field was again ploughed up. A very bulky crop of oats has been reaped this season, probably upwards of eight bolls per acre, but no part of it is yet thrashed.

Having detailed what may be considered a fair experiment during the whole rotation of the above eight acres, I may add, that turnip raised with bone manure, and fed off with sheep, has now become a regular part of the system on this farm; 15, 20, and, last year 25 acres were fed off, and invariable with the same favorable results, with the prospect of being able to adopt a five-shift rotation, and to continue it without injury to the land. Every person in the least acquainted with the management of a farm, of which a considerable proportion consists of light, dry, sandy loam, at a distance from town-manure, must be aware of the importance of this, from knowing the expense at which such land was formerly kept in a fair state of cultivation; indeed, the prices of corn for some years past would not warrant the necessary outlay, and large tracts of land, capable of producing barley little inferior to that of Norfolk, must speedily have been converted into sheep pasture, but for the introduction of bone manure.

Note.—For the last four years, 25 bushels of bone-dust have been given to the acre: the price this year was 3s. per bushel, or £2 15s. per acre.

[The foregoing article places in a striking point of view, the value of a kind of manure which is entirely neglected in Virginia, and used no where (we believe) in the United States, except near the city of New York, and there to a very limited extent. Two individuals are there engaged in pulverising bones for sale—but though the price of the prepared article is much lower than in England, there is not sufficient demand for what the mills have pounded, and a large quantity recently was about to be exported to England for a market.

Many farmers would try the use of bones if they could be pounded by their own laborers: but this cannot be done (as yet) with economy, and the owners of mills in and near our towns, have not thought of entering into the business. Yet there can be no doubt of the profit to all the parties, if some one having proper facilities for procuring the bones in sufficient quan-

tities, and for pounding them, would commence the business, and intelligent and improving farmers would buy the new manure. The prices in England have been regulated by long and accurate trial of the effects of the manure—and farmers have been thereby convinced that they can afford to give prices varying between fifty and sixty-six cents the bushel. Here they might be profitably prepared by millers at half that cost—and therefore might be applied with double profit by the purchaser. We hope that some one of the owners of the great flour mills in Richmond or Petersburg, whose machinery and water power are almost without employment for the greater part of the year, will make a trial of crushing and grinding bones for sale, and that their neighbors, the "town farmers," will take care that the want of purchasers shall not cause loss to the enterprise, or put a stop to the work before a full and fair trial of the effects of the manure.]

ON WATER FURROWING.

To the Editor of the Farmers' Register.

Goochland, July 31st, 1834.

Believing the agriculturist's to be the basis upon which the prosperity of every other avocation depends, and feeling well assured that your invaluable paper happily comports with its design, of sustaining the interest of the farmer, I have presumed to transmit to you a few, though very imperfect thoughts, relative to one out of the many interesting topics, which require consideration. This being a day peculiarly noted for energy and activity, I believe it to be the imperative duty of every man who is a friend to his country and to mankind, to contribute his mite, however small, if it can have a tendency to promote the interests of his fellow men.

It must be apparent to the least minute observer that the present dilapidated aspect of our country must be ascribed to the pernicious system practised by our forefathers, viz: that of ploughing and tilling their crops up and down the hills. I believe our lands, especially of the upper country, sustain more injury from washing than from any other cause. If so, it should be a primary object with the farmers to adopt a plan, which will prevent the surface of his hills from gliding into the bottom, thereby impoverishing the former, while the latter would be furnished with more than can be digested.

As a remedy I would recommend the trenching or furrowing system, which though simple, is powerful in its effects. From experience and observation, I am well satisfied that if they are judiciously run, the soil on our hills may retain its primitive location. I would recommend that they be run with as little descent as will carry off the water, and at the same time preserve them unbroken. I would have them made immediately after ploughing, so as to insure the land to sustain no injury. Their number should be multiplied in proportion to the declivity of the hill on which they are made. As a straight line is the nearest distance between two points, and as water generally manifests a disposition to take a straight direction, which is very different from the one I would have it go, I would always have a hand to visit my wheat field after each rain, for the first two or three after the

wheat is seeded, and observe the disposition the water has in each furrow to follow the prescribed channel, and if a disposition to digress is seen, he should lay before it inducements, or put such barriers in its way, as that the desired course shall be necessarily followed. Thus our hills would not only improve in fertility, but our flats would be secured from the continued deluge of red lava, if I may so call it from its tendency to overspread with barrenness the most fruitful soils. I would also state, as perhaps I should have done before, that we should exercise some ingenuity in the laying off of our corn and tobacco rows, which should be done in such a way as that each row shall take off its own water, and thereby rendering the separate burden of each one light. In case that they should fail to comply with the proposed end, I would introduce a few furrows, and cause the ploughman to be very careful to preserve them, and if filled up by him, make it a rule that the hoes remedy all defects.

Thus our hill-sides would not only occupy a useful space on our farms, but by this and other improvements, equally essential in their places, such as restricting our stock from grazing only a specified portion of our farms, (and I would here say the fewer the number the better;) by clover, by manuring from our farm pens, &c., they would soon possess the attraction of cohesion, and vie in point of luxuriance with our most fertile plains: which would enable us to transmit to our posterity, estates capable of rewarding industrious, enterprising, and economical habits—and secure them from that rambling impulse, which is doubtless excited to a considerable extent, by the distressing appearance which our once fertile, but in many places, now exhausted farms exhibit.

R. D. KEY.

PRESERVATION OF TIMBER.

From the Genesee Farmer.

The season of the year being one in which fencing occupies the attention of the farmer, has led to several articles in your valuable paper on the subject, with various suggestions for the preservation of posts, &c. Some are for pickling, some for burning, some for lime, and then again ashes are recommended, while others are for turning them bottom upwards. Elsewhere, regard to the quartering of the moon is gravely insisted on, and even a horse shoe nailed on the bottom is by some held to be a specific against decay. How is it that perhaps the *most important and valuable* communication that has appeared in the Genesee Farmer, or any other agricultural paper, has not superseded all these recommendations for preserving timber? Why not give their attention to the really scientific and almost conclusive experiments of Mr. Kyan? It would seem as though that valuable and interesting article, selected for your paper under the signature B., had passed unread or without the consideration due to it, coming as it does supported by the result of five years' experiment. It would seem so, because it has excited no further notice nor inquiry in relation to it and I fear it has given rise to no experiments, or I think some more particular information would have been called for by the practical farmer. Under this impression—not having the paper within my reach containing B.'s extracts—I will again ask

the practical man's attention to a few facts in relation to Mr. Kyan's discoveries, as detailed in a lecture delivered by Professor Faraday, at the Royal Institution, London, in Feb., 1833.

Corrosive sublimate had long been known to possess an anti-destructive property; and a gentleman, reflecting on this property, proposed to apply it to timber for the prevention of dry-rot—that is, cases of decay whether arising from one cause or another, and no matter how shown. Mr. Kyan's conviction of its efficacy became such, that he laid the subject before the Admiralty, who required nothing less than the test of the "Fungus Pits" at Woolwich, to prove the soundness of the application. Submitted to this for two or three years, the Admiralty advised Mr. Kyan to take out a patent, and are still engaged in watching the progress and results of the severest trials which have been suggested since that time. A solution of corrosive sublimate is made, and the timber or other substance to be preserved is saturated with the solution—this being done, it is dried, and said to be prepared.

This lecturer then said that, "besides the application of corrosive sublimate to timber, it has been applied to various fabrics not composed of wood, as for instance, canvass, cotton, tows, and hemp, to prevent their decay. Before him were some of the pieces submitted to trial by order of the Admiralty three years ago in the "Fungus Pits" at Woolwich, which he (Prof. Faraday) went the other day to see opened. * * * * * One specimen was a piece of timber which came out at the end of three years as sound as it went in! but the unprepared timber had decayed up to the very joints. No part of it had been left. It had decayed and become rotten throughout, but the piece before them was left whole and sound, and fit for the construction of vessels. Last week he saw a large cube of wood which had been there first for three years; it was taken out and examined, and put in for two years more, altogether making *five years*. That cube of wood was again taken and examined by him on Tuesday (the 19th Feb. ;) it was perfectly hard and sound. There was no sign of decay in that wood which had been submitted to the rotting action for five years, nor of that destruction which seems to have come on so soon in the same pit with other pieces of wood."

The Professor also stated that ————— had some prepared, and unprepared posts, placed in the most destructive situation, exposed to the same actions. After a certain time, the unprepared posts decayed, the others still stand preserved by the power of the solution.

Experiments made on cotton and canvass gave the same results; speaking of prepared and unprepared calico, Prof. Faraday remarked, "one was as it went in, but the other was the calico corresponding to it which had rotted and decayed. It was not possible to unfold without destroying it, yet it had been similarly exposed as the other."

This able and investigating chemist then confesses himself "perfectly satisfied of the preservative effects of corrosive sublimate," but still he had some distrust as to its application, lest the effect might be merely temporary, and that after a certain time fermentation might again be brought on and decay ensue. But from these doubts he was relieved by a course of experiments that satisfied

him—for he found that a chemical combination took place between the corrosive sublimate and the body to be preserved, and that it prevents the destructive power going on, by combining and forming a new chemical compound with the albuminous matter of the wood. "He had before him by way of illustration, a solution of corrosive sublimate, which would prove that the juices, or rather substances, remaining from the juices, in the fibres of the plant, were easy of combination; and if a stem or branch of a tree were cut, the branch allowed to bleed and the sap made to flow into a solution of the corrosive sublimate, combination did take place.

Professor Faraday found that no part of the properties of the corrosive sublimate were subdued, and in fact the substance was not in that state in which it could be volatilized, or removed at ordinary temperatures. Calico was washed repeatedly and thoroughly in water, for he considered if the properties of the application would resist the effects of water in calico, it assuredly would do so in timber. The prepared piece of calico, with an unprepared piece, thus washed, were laid on a board and placed in the cellar, and in due time were examined, when it was found that the latter was covered with a coat of fungus nearly half an inch thick, and the prepared calico was quite free from it." Afterwards, the mercury was separated by nitric acid, showing that it had been in combination. This able investigator then adds, "I think the improvement so great as fully to justify its extensive application."

This is a subject, it seems to me, of great general interest, not only to the farmer, but to every individual, and of great importance to all those who work in wood, not only as a security against decay, but as the most perfect mode of seasoning timber for the use of cabinet makers, carpenters, and others, in as much as mahogany and the most compact woods may be seasoned with the greatest certainty and perfection in the short space of two months! It is also an effectual protection against the destructive ravages of insects of every description. But, sir, to return to the more immediate interest of the farmer in these experiments, it will, if the application of so simple a preparation should prove permanently protective, give a usefulness and value to timber that is now only used in our stoves and fire places, making it applicable to all the purposes of building, and a sufficient substitute for the more expensive kinds in the form of posts, rails, fences, gates, hop poles, felloes, spokes, shafts, &c. &c. &c. It will also give durability to our cart covers, rick cloths, bags, &c. &c.; and is an easy defence against moths in carriage linings and other woolen articles, where it can be safely used, for it is a poison.

In the several publications sent me on the subject, I nowhere found the required strength of the solution, which I have since ascertained to be one pound of corrosive sublimate to five gallons of water. Of this a pine board will take up its quantum in forty-eight hours, in the proportion of about five ounces of the solution to every 216 cubical inches—thus to prepare a post six inches square, that was to be set in the ground two feet six inches, there would be a consumption of about twenty-five to thirty ounces of the solution.

I would suggest sinking a vat or tank in the ground, well set in clay, and made of plank about

three feet deep, and of a length that may be most convenient. Filling this tank with the solution, the posts to be prepared may be set upon the ends intended to be put into the ground, until they have imbibed their quantity, and then removing them let them be replaced by others, and so on. It will be necessary that the tank should stand under cover from rain, and prudence will at once suggest the propriety of having it under lock and key.

Perhaps B. has already commenced the preparation of timber-upon Mr. Kyan's plan; if so, we shall probably have some useful information from his pen, as to the best and least expensive way of preparation, with its actual cost in this country. Or the New York State Agricultural Society may think well of causing a series of experiments to be instituted and reported through their own useful little paper, "The Cultivator."

Could I have lain my hand on the extracts on this subject, which have already appeared in your paper, but which I believe are in one of the numbers of the third volume, now at the binders, I probably should not have been led into so much repetition. You will, however, prune and curtail my long communication to suit your own convenience and the patience of your readers.

R.

Maple Grove, April 25, 1834.

ASHES ON FARM YARD LITTER.

To the Editor of the Farmers' Register.

I am pleased at the many communications made in the Register, upon the subject of manures, than which there is nothing more important. From a little attention, I now manure two acres for one. My farm pen manure, composed of stalks, straw, leaves, &c., imparted very little fertility to the land, from the cattle dropping their excrement under their shelters, and very sparsely mixed with the litter of the pen. I have found it advantageous, (and from the present appearance of my corn, admitted by my neighbors,) that by putting a few cart loads of ashes on my farm pen as the litter increases, the difference is scarcely perceptible in the corn on land manured from the farm pen and that from the stable.

S.

THE CICADA SEPTEMDECIM OR, "SEVENTEEN YEARS LOCUST."

From the New England Farmer.

Mr. Fessenden—Much alarm has been created among those whose reliance for a livelihood is on the fruits of the earth, by the annunciation that the land is this year to be overspread with locusts. Many stories of the devastations committed by this fifth plague of Pharaoh have been collected and circulated; and it is doubtless impressed on the minds of multitudes, that we are, in reality, about to see this direful scourge of the east—that the earth is to be covered and the land darkened, and every herb of the land and all the fruit of the trees is to be eaten, and that no green thing is to remain in the trees or in the herb of the field. All this honest misrepresentation and consequent panic, only shows how much there is in a name. For these stories are in no important particular applicable to our insect. At your request, therefore, I offer the following, as the best account I can give

of them. And why does not the entomologist do as great a service to the public, by being able to dissipate their groundless fears, as the astronomer, who by his labors, has taught us the cause, period and harmless nature of an eclipse, a phenomenon which is still regarded by the untaught savage with consternation.

The truth is, our locust is not a *locust*—it belongs to an entirely different order of insects. Its history, so far as I have been able to collect it is as follows.—It belongs to the genus *CICADA* of the order *Hemiptera*, section *Homoptera*. Some of the *CICADIADÆ* have long been celebrated for their musical powers; so much so, that a portion of them have been grouped together and distinguished by the name of *Cantatrices*, or singers. Their music, which is peculiar to the males, is not produced by the mouth, but by a musical instrument, something like a kettle drum in construction, situated under the chest and covered by two large scales or plates. They live on trees and shrubs, the juices of which they suck. For this purpose they are provided with a long, pointed tube, composed of several distinct pieces, which they fold underneath them when not in use. From the perforations which some of them make in a species of ash (*Ornus*) exudes the substance so well known to us under the name of manna. The female is provided with an ovipositor or auger, of a horny substance, about a third of an inch in length, usually resting in a sheath or groove in the body. This is composed of three pieces, two of which are spear-pointed and finely indented at the end with teeth like a rasp. With this she perforates obliquely the solid substance of the small twigs, and then forming the three pieces into a tube, conveys her eggs through it into the opening. Having filled this with eggs, she moves a little, either along the limb or directly sideways, and performs the same operation until she has deposited all her eggs, which usually amount to from 500 to 700. The eggs are long, white and shining, and somewhat resemble herd's grass seed. The perforations are marked by little elevations, caused by small splinters fixed at one end and detached at the other, thus serving as a lid or valve to the opening; and they look as if they might have been produced by shot, driven in at an angle of 45°. Virgil supposed that these grooves were actually caused by the bursting of the very shrubs from the loud and querulous music of the insect. They usually select dry twigs for this purpose, probably because the moisture of a green one would prove injurious to their eggs; and in the case of the seventeen year species, the shrub oak is most frequently sought. When the eggs are hatched, the young larvæ immediately enter the earth, which they reach either by travelling down the tree, or according to some, by the dropping of the dead twig to the ground before they are hatched. In the earth they remain in a nymph state till the seventeenth summer, from which circumstance they receive their specific name, *Cicada septemdecim*. Of their development or mode of life in this state, little, if any thing, is known, though a course of observations is now in process from which we may hope to learn something, if the observers should be permitted to live out this insect's term of life. Probably, however, they are rather useful than injurious, by keeping down a superabundant growth of herbage.

Dr. Shurtleff, in a preceding number of your paper, by comparing the records of the appearance of the *C. septemdecem*, thinks there must be some mistake as to their period of appearance. This discrepancy is easily and satisfactorily removed. It is the same as to say that because calves may be born every month in the year, the period of gestation for the cow cannot be nine months. The seventeen year Cicada is in fact seen every year in some part of our land, and perhaps nearly every year in the same place, in small numbers. In 1831 I received specimens of it from Sandwich, Mass., in 1832 from Genesee County, N. Y., in 1833 from Martha's Vineyard, and this year they are abundant in various parts of our land, especially at the south. Thus it will be readily seen how the same family or swarm shall appear and propagate only once in seventeen years, while members of other families may exhibit themselves at any time in the intermediate period.

There are several species of Cicada among us, to be found every year, but none of them in such vast numbers as to conceal the foliage and bend or even break down the branches on which they lodge, as does this species. Among them are the *C. pruinosa*, the most common, and the *C. tibicen*, which last measure two and a half or three inches in length, and it is said that the noise of a single individual is such that it may be heard a mile. The *C. septemdecem* may be distinguished from all the others in our land by its smaller size, being about an inch long, its black body, and the eyes and nervures of the wings, usually of the color of brick dust or sealing wax.

As to their inclination or ability to do harm, these are both very small. What they do while under ground, as before observed, we know not. While among us, their only object seems to be, to pair, and deposit their eggs. For this purpose they live a merry day or two, subsisting on a few drops of sap, and stunning our ears with their noisy din, and then become a plentiful source of sustenance to many birds and beasts. It is said that the American savages have sometimes used them for food, but I am not aware that they are ever employed as such by civilized man. It is also said that life has been destroyed by them.—We can easily conceive them to have the power of inflicting severe wounds when confined in a hat or otherwise, by their powerful ovipositors, and these wounds may even prove fatal. But, on the whole, the Cicada is quite as harmless, and far less annoying than the mosquito. Its deafening din is far more tolerable than the shrill and quiet hum of the latter, and its hydraulic apparatus consumes a far less vital portion of our precious substance, than the sanguinary lance of the mosquito.

A short comparison of the Cicada with the true locust (*Gryllus*) will at once show the difference between the two insects, and the little reason there is to be alarmed at its appearance. The locust belongs to the order ORTHOPTERA, the cicada to the order HEMIPTERA. The form of the locust and its habits are the same as our grasshoppers, which are, indeed, our locusts:—that of the cicada, as is well known, is very different. The two grand differences, however, are, that the locust attains its whole growth above ground; and that, too, in the space of a month or two, and consequently requires a large amount of herbage to maintain its growth. While the cicada has ob-

tained its full size and development when it first emerges from the ground, and requires little or nothing to support it during the few days of its existence. And again; the locust is furnished with powerful jaws for masticating his food, while the cicada has only a tube for taking in fluids, and is utterly incapable of devouring any thing. Apologizing for this long communication, I remain,

Yours, &c.

AUGUSTUS A. GOULD.

July 3d, 1834.

CULTURE OF CUCUMBERS.

From the Genesee Farmer.

It was not until a few days past that I received the 18th No. of the Genesee Farmer, in which there is a very interesting communication on the culture of melons. I design now only to say a few words respecting the advantages of using straw in trenches according to the recommendation of Judge Buel—a suggestion with which I was equally pleased with D. T.—and these simply in reference to the raising of cucumbers. My object however is to draw the conclusion that similar results may be attained by a like preparation for any other vines belonging to the same natural family.

Cucumbers are very difficult to grow in our gardens to any extent, in this part of the country. As soon as the vines arrive at a bearing state, and produce a scanty supply, they begin to sink under the effort and speedily become exhausted. It is only in low moist places that we can raise them plentifully.

Early in the spring I had a small piece of ground prepared in my garden, by digging a trench about twelve inches wide and as many deep; and not more than thirty feet in length—in the bottom of which fresh straw was laid and made compact to the depth of two or three inches. The earth was then replaced, raising it high enough to form a gentle ridge. Thirteen vines survived the injuries of the frost and insects, and the product of these was indeed extraordinary. I can safely say that we gathered several bushels of cucumbers from them. They began to bear early, continued to grow luxuriantly for a length of time; and have at last only given way beneath the intense fervor of the dog days.

My object as I have stated, in detailing the successful result of this trial, is to show that the same preparation will doubtless be well adapted to the growth of melons. The quality of the melons will probably be also rendered more delicious than by the free use of manure—a practice which however it may increase the number, must always materially impair the excellence of a fruit of such delicate and exquisite flavor.

In making these remarks, it is far from my intention to detract from the merits of the other modes recommended by D. T. They are at least highly valuable, inasmuch as they will insure an abundant supply of melons at an earlier period of the season. The mode I have detailed may be a useful auxiliary in contributing to a succession.

T. S. P.

Beaverdam, Va. 8mo. 20th.

ON THE REVERSION OF WHEAT INTO GRASS.

By MR. MAIN, Chelsea.

From the Quarterly Journal of Agriculture.

I beg to offer a few remarks on the "Reversion of wheat into grass" as stated in a paper* by Mr. W. Blackadder in the December Number of your Journal. Mr. Blackadder's supposition is not new. If I mistake not, one of the earliest writers on agriculture,—Columella or Pliny, I forget which,—conceived that the original type of our cultivated wheat was the *Bromus mollis*, soft broom-grass; and I have met with an old farmer in the county of Hertford, who was of opinion, that light winnowings of wheat if used for seed, become changed into ray (*Bromus secalinus*) and darnel (*Lolium temulentum*.)

That there should be various opinions respecting the original type of wheat is not at all wonderful; because, unlike many other cultivated plants, no trace of it in a wild state is any where to be met with—not even in its native country, Egypt. It is perfectly true, that the sorts cultivated in the northern and alpine regions of India, are far inferior to the varieties cultivated in Europe—more, indeed, like rye than wheat. Still, even there, wild wheat is not found. But this, I think, may be easily accounted for. No plant requires the protection of man more than wheat; it is not only his "staff of life;" it is equally coveted by every granivorous bird and every grazing beast, whether in its green or in its mature state. It is seldom we see the scattered grains arrive at perfection in our lanes or hedges, and if a plant springs up in the latter situation and comes to maturity, the increase is quickly devoured either by birds or mice. In fact, the protection of the rick-yard, barn, and granery, is absolutely necessary for the preservation of wheat for the use of man. With respect to the opinion of the Hertfordshire farmer, his mistake (as it certainly was) is easily accounted for. If either ray or darnel grew in his wheat—and few crops can be seen entirely free from one or other—their seeds would most likely remain with the lightest portion of the bulk; and if this inferior sample were, through penuriousness, chosen for seed, a great share of the succeeding crop would certainly be ray or darnel, or both; confirming the blind and careless cultivator, that his "swans had become geese." But whether such a transformation, as that of wheat into any of these grasses, can in any way take place is the question.

In viewing the whole vegetable kingdom, we observe genera, species, varieties and subvarieties; the last carried out, in many cases, beyond all appreciable limits. The types of many genera are no more like the varieties obtained from them by high cultivation, than if they were totally distinct and different beings. For instance, the sloe and the magnum-bonum plum; the gean and Knight's black-heart cherry; the crab of the hedge, and the monstrous rennet apple. Among herbs, compare the wild with the drumhead cabbage; the wild with the Altringham carrot; and the perennial ryegrass with Pacey's variety of the same. Botanists enumerate near thirty species of wheat, and some hundreds of varieties; but not one of these can be fixed on as being the type of the summer and winter sorts now in cultivation; both being, in all probability only varieties. Taking

into consideration the difference of structure and qualities exemplified in the cultivated varieties alluded to, we only see an *amplification of parts*. In some the roots and stem are enlarged, as asparagus; in others the number and size of foliage and flowers, as cauliflowers and cabbage; some have the integuments of the seeds enlarged, as the apple; others the seeds themselves, as the cob-nut, and the Windsor bean. In all these changes, however, increase of volume is the most striking characteristic of variety. There is no change of *generic character*, or of constitutional organization; and therefore we are led to conclude, that no genus is capable of being transformed into another.

None of the natural orders of plants bear a stronger resemblance to each other than do the 158 genera composing *Gramineæ*; viewing them from the *Bambusa arundinacea*, a tree grass, down to *Aira humilis*, the least hair-grass on Mount Caucasus, a strong likeness runs throughout. Notwithstanding this general similitude, every genus is distinctly marked both physically and botanically; and there appears not the least likelihood that they are amalgamable into each other or changeable in any other way than as is remarked above. We have, it is true, instances of vegetable mules, that is, intermediate productions between two species partaking of some semblance of both parents; but these instances are not only extremely rare, but the progeny, like animal mules, are imperfect in reproductive functions, and quickly cease to exist. Florists' mules, obtained by cross impregnation among kindred varieties, show changes of habit or colors only, not changes of generic character.

Applying the foregoing observations to the circumstances detailed by Mr. Blackadder, I would infer, that there has been some mistake in the instances cited. That the *giant-fescue* appeared on the spot where the smutted wheat was deposited, there can be no doubt; but that this grass sprung from *dead* grains of wheat is perplexing. Smutted ears or grains of wheat, barley, or oats, never flower, and consequently cannot be fertile.* The smutted grains of wheat, however, when mixed in the bulk, are nearly of the same size as those of darnel, and might be easily mistaken the one for the other; and thus, I dare say, it has happened in the trials of Messrs Strachan and Bell.

Both the ray and darnel require to be sown in the autumn, in order to their flowering in the following summer. The first yields a heavy crop of seed of excellent quality, relished by every bird and beast; the second has a long spike of large seeds, in flavor as bitter as gall, and in quality intoxicating, and even dangerous if ground in bread corn or mashed in distillers. This is like the *sleepies* mentioned by Mr. Blackadder.

Being at a meeting of the Linnean Society a fortnight ago, I mentioned the circumstances of the "reversion of wheat into grass," to Messrs David and George Don; they both agreed with me in thinking that the seeds of the *fescue* or *brome* had been *unintentionally* sown with the smutted grains of wheat.

*What is here taken for granted, namely, that smutted grains of wheat never flower, and cannot therefore be fertile, constitutes, we conceive, the very essence of the question "Whether such a transformation can in any way take place?"—EDITOR JOUR. AGR.

* See Farm. Reg. p. 126, Vol. II.

The *bromus secalinus* spoken of in the foregoing article is what is called by the name of *cheat* in Virginia, and the *lolium temulentum* (or *darnel*) is our *spelt*. Those who believe that either, or both of these plants are the products of wheat, may here see their opinions supported by that of the old Hertfordshire farmer above quoted: but at the same time, they should observe that this opinion is evidently stated as one not entertained by many, if by any other persons—which could not be the case if the supposed change was possible, and a matter of frequent occurrence, as is supposed by many persons here.

As both of what we call cheat and spelt are English weeds, it is strange that we hear nothing of either being very injurious to the wheat crops, as is the case here, and particularly with spelt.

We have reason to believe that spelt has not very long been known in Lower Virginia, and that the seed was first brought from England in the provender of imported English race horses. This opinion is supported by a fact stated by Col. Thomas Emory (in a former volume of the American Farmer,) that this plant was not known on Kent Island, in the Chesapeake, until after some British cavalry had been stationed there during the last war. We should be glad to learn any facts serving to confirm or disprove the supposed recent introduction of spelt into this country. If there was a time, since wheat was generally cultivated, that we were clear of spelt, (or darnel) or if there is any part of the country which is still free from it, these facts alone ought to prove that its origin is not from wheat.

We add below the article from Loudon's Encyclopedia of Plants, on the Grasses, which gives some information of what we call spelt. The author does not notice (if he had ever heard of) its supposed change from wheat. We dissent from his opinion of the harmlessness of the seed as food for man, whatever it may be for beasts. When it has been largely mixed with wheat, we have heard of several well established facts of the bread producing sudden and violent sickness.

GENERAL CHARACTERS OF THE ORDER OF GRASSES [GRAMINEÆ.]

From Loudon's Encyclopedia of Plants.

The order of grasses is beyond doubt the most natural of all that the ingenuity of systematic botanists has contrived; it is also the most numerous in species. The inflorescence is very much alike throughout the order, and the floral envelopes, which are bractæ in a progressive state to the form of calyx and petals, offer few striking characters by which the genera can be characterized. Hence it is that the classification of the order, and its division into genera, has not only been found extremely difficult, but has given rise to much difference of opinion among botanists; some of whom, adhering to the synthetical arrangement of Linnæus, admit but a small number of genera, while others, admitting the analytical principles of modern science, divide it into a vast number. The middle course in this, as in most other cases, is probably the just one. A subdivision of the order into tribes, has been attempted by Palisot, Trinius, Dumortier, Raspail, Kunth, Link, and others; that of M. Kunth is here adopted.—The general habit

of grasses is so familiar to every one, that it may be passed over in silence. They are remarkable for exhibiting, in no case, properties that are actually poisonous; possessing on the contrary, in almost all cases, wholesome and nutritive qualities. These latter are especially obvious in their seeds, which always contain a farinaceous substance, mixed with a certain proportion of glutinous matter. No one is ignorant of the various and important uses of the seeds of wheat, rye, barley, oats, maize, rice, and others, and in general of all the larger kinds of grass. It must however be remarked, that if the smaller sorts are not employed in like manner, it is merely on account of their minuteness, and not on account of any difference in their nature; in fact, in times of scarcity, and in half cultivated countries, use has advantageously been made of *Festuca fluitans*, *Zizania aquatica*, *Avéna fatua*, *Panicum sanguinale*, *Avéna elatior*, *Brómus secalinus*, and *Elymus arenarius*. It is also to be noted, that the particular uses for which the seeds of certain grasses are employed, are not peculiar to them, but may be obtained from all the others, with slight modifications. Thus beer is made, not only from barley but also from wheat; spirituous liquors not only from our European cerealia, but also from rice. But it must be remarked, that a singular exception to the generally wholesome properties of grasses, appears to exist in *Lolium temulentum*, the seed of which is reported to be narcotic and inebriating, and even poisonous; there is no doubt, however, that these qualities have been greatly exaggerated; for in the first place they disappear in bread or beer manufactured from *Lolium temulentum*; and secondly, in times of scarcity, people have frequently lived upon it. But even supposing all that has been stated upon the subject to be true, this plant will still be found to be little different from wheat, when long exposed to wet; so well, indeed, is this known by country people, that a belief exists, that in wet summers wheat is actually transmuted into rye grass. The exciting properties of the oat, which are very unusual in this order, have been found to reside in the husk and not in the seed, and to depend upon the presence of a minute quantity of an aromatic principle, analogous to Vanilla, lying imbedded in the envelope of the seed, and capable of being extracted by aid of alcohol. As to the deleterious effects of the ergot of rye, these do not depend certainly upon any such property in the rye itself, but is caused either by the ergot disease, or, as is believed, by the parasitic fungus, from the attack of which it arises. Now let us pass from the seeds of Gramineæ to their stems, and we shall find a no less remarkable uniformity of nature in them. They all contain, especially before flowering, a sweet sugary mucilage, which varies in quantity in different species. The sugar cane, in which this is found in greatest abundance, not only constantly exists in the most favorable condition for producing it, as it rarely flowers, but is also one of the largest grasses known. The maize also abounds in sugar; and the same substance is secreted in such abundance by the *Sorghum saccharatum*, that attempts have actually been made in Italy to cultivate it as the sugar cane.—The creeping roots of grasses, which are generally mucilaginous and demulcent, are sometimes used in medicine; but they are of more importance for retaining in banks the sand of the sea shore, so as to

form artificial cliffs on flat coasts, to restrain the inroads of the sea. The stems of *Andropogon schænánthus*, the leaves of *Andropogon citrátum*, the roots of *Andropogon nárdus*, and the whole plant of all the species of *Anthoxánthum*, exhale an aromatic odor, and possess slightly tonic properties. To conclude, the epidermis of grasses has been found to contain a considerable quantity of silex.

BAGBY'S THRASHING MACHINE.

To the Editor of the Farmers' Register.

The drum of a wheat thrashing machine has been lately invented, by a citizen of this county, (James Bagby) which for its easiness of draught and strength, and the rapidity and cleanness with which it thrashes wheat, makes it, in my opinion, superior to any I have seen. The cost of this drum is between sixty and seventy dollars, and can be easily attached to the horse power of any other machine. The one I use is propelled by the horse power of an old beating machine, and is easily drawn by four horses.

About a fortnight ago I made an experiment to see with what rapidity it thrashed wheat: the result was fifteen bushels in thirty minutes. No extraordinary exertions were used, except to make the mules by which it was drawn, walk a little faster than their ordinary gait (as my horse power did not give sufficient motion) and having a plenty of wheat ready and applied to the machine to prevent its waiting. Allowing ten working hours to the day, this will make three hundred bushels which this machine is capable of thrashing clean from the straw in that time. I examined the straw after it had passed through the machine, and very little wheat remained: I could find but few grains in a handful of straw. The wheat thrashed was the red shuck, a smooth headed red wheat of good quality. Another advantage which this machine possesses is, that the wheat and straw pass off in different directions; and its strength and durability are such, that in my opinion, with care it would not require any repairs for twenty years; and its construction is so easily understood, that almost any mechanic could then put it in order.

As all improvements in implements of husbandry are of great importance to a farming community, I concluded the public would be benefited by making this machine known through the Farmers' Register.

RICHARD G. MORRIS.

Buckingham, Aug. 26, 1834,

REPORTS OF THE SEASON AND STATE OF CROPS.

Through all August drought was severely felt in Lower and Middle Virginia, and part of North Carolina: how much further correct information does not yet enable us to say. Some crops of corn were favored by abundant showers in time to save them: but these favors were partial and few—and in general, the crop of Lower and Middle Virginia has been greatly injured. The long drought ended September 1st, when a spell of rain commenced, but which was too late to benefit any corn, except the few replanted, or otherwise very late and immature stalks. The crop

must be short of an average. In some neighborhoods where the suffering has been less, it is expected that the crop will be equal to that of last year. The price throughout the year has been higher than usual—varying between \$3 and \$3 75 in Petersburg—and higher in the southern counties, which have received part of their supply from Petersburg, by return loads of the wagons which brought their wheat to market.

A freshet of very unusual height is reported to have inundated the rich and extensive lowlands of the Roanoke, early in September. No particulars of this visitation have reached us—but it must have caused great destruction.

The reports of the amount of the wheat crop in Lower Virginia, have varied greatly in different places—but no correspondent has spoken of the quantity being equal to an average, while others have counted the crop of their neighborhood not much more than half of an average for the land. The quality of the grain is excellent every where. In the mountain region of Virginia, the crop was very abundant.

The cotton crops of the South were as promising as could be desired previous to the commencement of drought in August: it is not known yet whether any considerable loss has been sustained from that cause.

The drought in Lower Virginia made land generally so hard as to prevent fallowing in August, and that operation will be much more backward than usual—and it may be inferred, less perfectly performed.

The rainy spell of the first week of September, was very destructive to the early gathered corn fodder—and a second spell of showers and cloudy weather which began on the 17th, and has continued with but little intermission to the 24th, will be not less injurious to the latter gathering.

Rockbridge, August 19.

You can do nothing at this time, that will more promote the interest of this, and (as I believe) of every other section of our state, than to urge on the James River and Kenhawa improvement. From last Richmond quotations, wheat is worth 115 to 125 cents, whilst here an article of better quality will only bring 75 cents, and no purchases at that sum for any considerable quantity.

The wheat crop is good, and the quality better than usual. We are now suffering under a very severe drought. The corn crop must be cut short one-third or perhaps one-half. I have cut corn the last of September, and the blades not more injured than they are now on many farms.

New Store, Buckingham, 28th August, 1834.

I see from your Register, accounts from many parts of the country of the present crop. This neighborhood has and is now suffering very much for want of rain: we have had little or none for almost six weeks, and every thing is literally burning up. The fodder in many fields has burnt to the tassel, and corn could be but little benefited by rain now—it might be made heavier, but generally the substance is too far gone. That which was planted in good land early, is very fine; but the common high land will yield nothing. A portion of this county has not suffered much, and

there is many fine crops. Now is a trying time in tobacco, most of which is small; and unless we get rain in a few days, the crop is obliged to be small: and in any event, from what the writer has seen and heard, it will be another short crop. The wheat crop is not likely to yield as was expected; I think it will fall short nearly a third. The oat crop around this place was exceedingly sorry; and I doubt very much, whether taking the whole crop, if it can be any thing like an average one. There is little or no land fallowed in this county, and the season so far advanced there will be but little done at it, notwithstanding this is a great wheat growing county.

ALABAMA LANDS, AND AGRICULTURAL JOURNALS.

To the Editor of the Farmers' Register.

September 3d, 1834.

* * * * I promised you to make some effort to extend the circulation of your journal in Alabama when I saw you last spring on my way thither. I found the erroneous opinion very prevalent in that region, "that their lands were naturally so fertile, that the improving hand of man could impart nought, either to its fertility, or to the retention of its existing richness." But I am very much mistaken, if the opposite be not the truth: their lands are generally broken, and in many places sufficiently undulating, to be seriously injured by washing rains. It is true, they have lands, some cane-brakes and prairies, which, I presume, with a proper system of cultivation, can never be deteriorated—they only require a change to relieve them of a tiresome companion for years. It is a splendid planting country; and I believe, that there are portions of South Alabama, as healthy as any country in the world. The land, except for a short interval, is very dry—and they are blessed with fine limestone water. There is so much carbonate of lime in the soil, that if a portion be thrown into vinegar, instant effervescence ensues. It follows, that so soon as dead vegetables fall to the earth, they are decomposed. Pure air sweeps over the land, and as there are no ponds of stagnant water, no marshes, consequently, no miasmatic vapors. Of course, the country must be healthy, and I am surprised that any, who have had a personal inspection of the country, if profit is their object, can remain here. Your great and invaluable efforts will, no doubt, ultimately present a barrier to emigration, for although the advantages may be infinitely superior, yet the disadvantages in breaking up—making immense sacrifices in many instances of property—and of friends, relations, &c., in all cases, are enough to deter one of ordinary firmness from putting the design into execution. My feeble constitution makes it necessary, that I should seek a warmer climate, hence I go to South Alabama. The part with which I am most pleased, is immediately below the mountains, through Green, Marengo, &c. I regret very much to leave old Virginia; but with her are left the fondest wishes, the most ardent prayers of my soul, for her prosperity. I think, that Virginia is waking from her fatal lethargy—a lethargy, which had well nigh annihilated her hopes, and driven her enterprising sons to the "far West." You are

destined, I hope, to place her in that position she once occupied, and great will be your reward, in the unfeigned gratitude of thousands unborn. I shall carry with me your paper to the South, and shall make every effort for its extension. I need not say, I derive much gratification from its perusal.

[Some of the warmest friends and supporters of the Farmers' Register, are planters of the rich new lands of the South and West, and they are fully of the opinion that they have each an individual and private, as well as a general and public interest, in the support of the work. But we are aware that such opinions are comparatively rare—and that most of those on new and very fertile soils, hold such opinions as are quoted by our correspondent above, "that no agricultural publication is wanted for those who cultivate soils of such great fertility." This is a mistaken view, in every aspect. It might be easily shown that the sound rules for adding fertility to impoverished soils, would be useful for the preservation of the fertility where it has not yet been lost—and no matter how rich may be the planter's land, nor how low the price at which he can purchase more, it will always be more economical to preserve, than to waste or destroy the fertility of his soil.

But even if all is yielded that is claimed for these erroneous opinions—if it is admitted, to the fullest extent, that the Alabama planters cannot possibly profit by instructions for increasing or retaining fertility in the soil—still there will remain many important matters in which they may receive valuable and profitable instructions, and even from other farmers in remote countries, and cultivating under different circumstances. No matter how rich the soil, its management may be such as to yield a poor return to its owner: and it is as important to the Alabama planter, to economise his scanty supply of high priced labor, as for other farmers to economise and increase their means of fertilizing poorer soils. Information respecting labor saving implements, and labor saving processes in cultivation—of the peculiar qualities and respective value of improved breeds of domestic animals—and of their diseases, and the proper remedies therefor—of the new and more valuable varieties of cultivated plants, and of the causes of, and remedies for, the fatal diseases to which all crops are subject, and which often change, and exhibit increased virulence, or present altogether new appearances and effects. For example—when the rot was first extending over the cotton fields of the South, it would have been of great importance for intelligent and observing planters, to have made use of an agricultural journal, as means for exchanging their ideas respecting the new and destructive disease: and if such interchange of opinions and of facts, had not served to point out the remedy, it would at least have saved great expense to many planters in showing the worthlessness of measures which they supposed to be, and were using, at great trouble and cost, as remedies for the rot.

But putting aside all these important considerations, there is another, humble as it may be, that alone will

repay any farmer in Alabama or elsewhere, for his expense in taking an agricultural journal. This is, that through it he may at any time obtain an answer to his inquiries on any particular subject, which probably could not be done without such means, in twenty years, if ever. How much has not every farmer lost at some time, for the want of particular information respecting the value of a new crop, of different varieties of seeds, of new implements, &c.; which loss might have been avoided, if he had known where to seek and obtain the information needed. Every farmer would gain at least as much as his subscription money, by subscribing for, and reading some agricultural paper—and many would thereby gain a hundred fold. And if we are urging the support of our own interest by this advice, (as is readily admitted) we are also, and in a much greater degree, urging the advancement of the interest of others. But the Farmers' Register is not the only agricultural journal in the Southern States, to which the foregoing remarks will apply—and they speak at least as strongly in favor of the support of other journals as of our own. The publication nearest to the farmer, if equally well conducted, will of course be most suitable to his wants and circumstances, and therefore best deserving his subscription.]

TO DESTROY WILD ONIONS.

To the Editor of the Farmers' Register.

One of your correspondents signed J. E. M. makes inquiries through the Register, whether there is any way discovered to destroy wild onions? Believing it may be effected by a simple process, which I accidentally discovered many years ago, I feel it a duty I owe to my fellow agriculturists to make it known. I had a lot near my house, which I usually cultivated in tobacco and wheat alternately, in which there was about one acre so infested with the garlic, or wild onion, that I usually separated the wheat made on that part of the lot, and kept it from the rest. Some thirty years ago, I had prepared this lot for tobacco, but failing in plants, I put it in corn, and cultivated it well until harvest, but did not touch it afterwards. It threw up a heavy crop of crab-grass, and I was compelled to cut the hay off of it before it could be sown in wheat. At the next harvest I was surprised to find all the onions had disappeared, nor has that piece of ground been pestered with them since, and I have this summer taken a crop of early wheat from the same lot. A little reflection convinced me they were smothered by the close and small fibres of the crab-grass.

Some years afterwards I made an experiment on another piece of ground that was infested with the same weed. It was ploughed and harrowed early in the spring, and the next fall it was seeded in wheat, and I discovered at the next harvest the garlic had disappeared: nor have they appeared since—and as my farm has not been much pestered with garlic, I have never had occasion to resort to the same remedy since.

Before I conclude I will make a few observations on the cure and prevention of this pest to so many farmers, in hopes that some one of the fraternity will make the experiment on a larger scale than it has been done by myself. All summer crops in-

crease the evil, for the garlic propagates more from the roots than the seed. Coarse stalk grasses such as clover, will not smother them. Should the land be too poor to produce a heavy crop of crab-grass, it must be manured. Where the onions are as thick set as they are in some parts of the tide-water country, it may be necessary to repeat the process a second time. To prevent their increase, the seed ought to be selected on that part of the farm that is clear of the pest.

ONE OF THE PAY ALLS.

Aug. 20th, 1834.

[At page 530, Vol. I. Farm. Reg. there is a statement of effects very similar to the above, of the destruction of blue grass, by its being smothered under a heavy cover of crab (or crop) grass.]

TO SUBSCRIBERS.

With this number bills will be sent to all subscribers who remain indebted for the first volume of the Farmers' Register. This step has been delayed until this time, and is reluctantly taken now, because we know that these duns will reach many who are in arrear merely from inattention to such small matters, and whose payments are as certain, and their patronage as much valued, as of any subscribers we have. To all such, a sufficient apology will be apparent, in the necessity for one uniform rule being adopted for all similar debts, without regard to persons.

We have used every care to give, promptly and correctly, the proper credits for all payments, in the monthly receipt lists published on the covers: and the correction of any error, or omission, has been regularly asked in the standing heading to those receipts. If notwithstanding these precautions, and the means thus furnished to every subscriber to know and correct mistakes, some should still remain on our books, we cannot be justly blamed for their continuance. Our whole course of procedure affords ample evidence of the wish to avoid mistakes, and to correct all previously made. If therefore, bills should be sent to any who have already made payment, we hope that the error will be imputed to any cause but design on our part. In these, as in all cases, we will readily and gladly be corrected, by being better informed.

TO CORRESPONDENTS.

The following communications have been received. "A commentary on the law of Virginia concerning enclosures"—"Queries respecting herds grass and wet lands"—"Rainy day reflections, &c."—"On thrashing machines"—"Calcareous deposits on Piankitank River"—"On the improvement of agriculture"—"On the cultivation of fruit trees"—"Directions for making ox-carts, &c."—"Cost of legal fencing, &c."

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No. 6.

EDMUND RUFFIN, EDITOR AND PROPRIETOR.

ON THE BREEDING, REARING, FATTENING, AND GENERAL MANAGEMENT OF NEAT CATTLE.

Extracts from the last edition (1833) of the "Complete Grazier."

[Continued from page 272, Vol. II.]

On the feeding of Calves for veal.

Veal being a favorite article of diet, the fattening of calves is an object of no small importance, particularly in the vicinity of the metropolis. Hence various sorts of food and modes of treatment have been recommended; but the most effectual, and consequently the best way, is to keep them in pretty dark places, in pens, (lest they should fatigue themselves by sporting too much in the light, which would be injurious to them,) and to feed them solely on the cow's milk, with the addition of a little meal, for the last few weeks. It is also a common, and not an injudicious practice, to give them about a wine glass full of common gin or rum, mixed up in as much flour as it will moisten, in the intermediate time between their being suckled: it is made into balls, and forced down the throat; and on this treatment the animal will generally become sufficiently fat in from ten to twelve weeks: it is not desirable to keep them a day beyond the time when they are fit for the butcher, as small veal is preferred to large, if equally fat. As cleanliness is an indispensable object in fattening cattle, it should likewise be particularly attended to; for this purpose, the pens ought to be elevated at such a height from the ground that the urine may pass freely off; fresh litter should be supplied every day, in order that they may lie dry and clean; and a large chalk-stone should be suspended over the pen, so that the calves can easily lick it.* It is also a common practice to bleed them when they are four or five weeks old, and again a little time before they are killed, by which contrivance the whiteness of their flesh is supposed to be greatly increased: the quantity of blood taken is about two quarts, or more, according to the age and strength of the calf. The operation of bleeding is therefore frequently repeated by some persons, though it does not appear to be altogether necessary; as the most experienced breeders are of opinion, that it is sufficient to bleed them twice, drawing from them such a quantity at each time as their age and size will allow, without hazard of destroying the animal, and others deem it altogether superfluous.

The following mode of rearing these animals prevails chiefly in the vicinity of Abbey-Holme, in the county of Cumberland, where the calves are remarkable for their size, fatness, and fine white color; before, however, we detail the practice of the breeders of that place, it will be necessary to remark, that their stock is of various ages, in order that their plan may be carried on without interruption. For the first two or three weeks,

the young calves are fed in the common way; and, at the end of that time, are conducted to a feeding-shed. Here two small stakes are driven into the ground for every calf; at the distance of ten inches or a foot from each other; the head of the animal is then put through the intermediate space, a strap or cord being passed round its head, on either side of which there is a ring, which surrounds the stake. By means of this contrivance the calf is prevented from licking itself, which habit would materially affect its health and growth, while it is not so confined as to be hindered from lying down or rising at pleasure. When the calf is reconciled to its new habitation, the Abbey-Holme farmers supply it with better food than it has been accustomed to receive. Rightly judging that the latter part of a cow's milk is more nourishing, and of a richer quality than that which is first drawn, they divide the milk according to the respective ages of the animals; invariably giving the richest part to the oldest calves: so that, as the milk may lessen or improve in quantity or quality, they can at all times, regulate their stock by diminishing or augmenting their numbers. Another circumstance peculiar to that district is, the regulation of the temperature of the feeding-sheds according to the alteration of the different seasons, so as to keep them, as nearly as possible, always at the same degree of heat.* Cleanliness is also an object of rigorous attention, the place being kept constantly dried, and supplied with a proper quantity of good litter; and, on this subject, it should be observed, that oat straw has been found to render them lousy. In case any of the animals' appetites fail, so that they do not regularly take their food, they are immediately consigned to the butcher, and their place is occupied by the next in age.

In Holland, we are informed that the calves are reared in long and narrow, but tolerably lofty, suckling houses. The pen in which the calf is kept is so narrow, that it cannot turn round, so that it can only go backwards to the end of the pen, which is also short, and forwards to the door: the house is kept in total darkness, and the pen kept perfectly clean and sweet. When the suckler comes to administer the milk, a small hole is opened, sufficiently big to admit its head to be thrust out, and which is made in the door-way; as soon as the animal perceives the light, it advances towards it, pushes out its head, which the suckler puts into the milk pail; and, being taught to drink the milk, it very soon gets fat, and much quicker than by either of our modes, where the calf is usually tied up, or is permitted to run about in an open place. The Dutch farmers hang up a piece of chalk near the door, for the animal to lick; and when the calf is about to be removed, the pen is

* Chalk is commonly supposed to assist in whitening the flesh: that idea is probably erroneous; but it has an essentially salutary effect, in correcting the acidity of the stomach, to which calves are very liable, and thus preventing the consequent scouring.

* This practice cannot be too strongly recommended. Warmth is, indeed, well known to be essential to the health, and particularly to the improvement in flesh, of all animals; but sufficient attention is not generally paid to the maintenance of an equal temperature; though, next to proper shelter, it is the point of greatest importance.

so contrived, as to height, that, when the door of the suckling-house is open, it falls down on the tail of the cart, and the animal walks into it, and is secured. The floor of the Dutch calf-pens is of lattice work, so that it always lies dry.*

The district of Strathaven, in Lanarkshire, is celebrated throughout Scotland for the excellence of its veal, and there the only plan pursued is simply feeding the calves on milk alone, without the addition of any extraneous food, or nostrums for promoting rest, and without having recourse to bleeding. They are not allowed to draw the dam, but are suckled by hand, as is usual in many parts of England, both because the quantity of milk given to the calf can be thus better ascertained and more regularly distributed, and the sucking by the teat is considered disadvantageous to the cow. The reason assigned for this is, that when the entire milk is not given to the calf, the cow retains a portion of the remainder that is taken off by hand; and that when young, the calf does not drain off the milk completely; and it is well known that the milky seerskin is diminished whenever the udder is not completely emptied.† Some of the Strathaven feeders give the milk at first sparingly, from an idea that it sharpens the appetite of the calves; but others, more naturally and with as good effect, allow a full supply from first to last. For a week or two after they are calved, they are not found to consume more than about half of a good cow's milk, but the quantity is gradually increased to as much as they can drink. A well grown calf, at four weeks old, will consume the entire milk of one cow; if thriving well, it will, in two or three weeks more, take the greatest part of the milk of two cows; and in order to bring them to the greatest degree of fatness, it is common to give those which are farthest advanced the last drawn, or richest part of the milk of three cows for two or three weeks after they are four or five weeks old. This last practice, however, is scarcely necessary, for it will generally be found that the animals will be fit for the butcher, in about six or seven weeks, without any other attention than to give them abundance of the whole milk; to keep plenty of litter under them in a place that is well aired and of moderate warmth; and to exclude the light. Some have mixed eggs, and others have put meal into the milk; but the best feeders do not approve of such admixtures, which, they say, darken the flesh, web, and lights of the animal.‡

The very intelligent writer from whom we have extracted this account, does not state the average measured quantity of milk consumed by the calves during the process of fattening; but he says, that the Strathaven farmers calculate on realizing ten shillings per week from each calf, valuing the milk at from 1½d. to 2d. per quart; and that, many have used their milk in feeding veal when they could

have sold it at these prices. If so, it is clear that either the system, or the stock, must be superior to any thing of the kind in England; for the calculation of the profit of suckling in Essex, where it is usually practised for the London market, as given in the Survey of that county, is only four shillings and sixpence per week, and although that may be under the mark, yet ten shillings would probably be at least as much above it.

Of steers and draught oxen.

A good ox for the plough should be neither too fat nor too lean; as, in the former case, he will be too lazy; and in the latter, he will be too weak and unfit for labor. His body ought to be full, joints short, legs strong, eyes full, his coat smooth and fine, and every part well put together, so that his strength may be easily seen. Another requisite is, that he answer to the goad, and be obedient to the voice; but he can only be governed by gradual use and gentle treatment. Those calves which are designed for the yoke, should not be broken-in earlier than two and a half, or three years, lest they be overstrained;* nor should that operation be deferred longer, as they will become froward, and stubborn. Their work should then be so proportioned as not to affect their growth, which continues till about their seventh year; for if this be not attended to, their value will be lessened in a greater degree than will be compensated by their labor.

The strength of this animal, when properly trained and managed, is very great, and he has patience to endure fatigue; but, being naturally slow, he must not be exerted beyond his usual pace. The only method by which success can be attained is, by patience, mildness, and even by caresses; for compulsion and ill-treatment will irritate and disgust him. Hence, great assistance will be derived from gently stroking the animal along the back, by patting him, and encouraging him with the voice, and occasionally feeding him with such aliments as are most grateful to his palate. When he has thus become familiar, his horns should be frequently tied, and, after a few days, a yoke may be put upon his neck, when he should be fastened to a plough with a tame old ox, of equal size; next, the oxen should be employed in some light work, which they may be suffered to perform easily and slowly; thus they will draw equally, and the young steer will be gradually inured to work. After working in this manner, he should be yoked with an ox of greater spirit and agility, in order that the steer may learn to quicken his pace; and, by thus frequently changing his companions, as occasion may allow, he will, in the course of the first month or six weeks of his labor, be capable of drawing with the briskest of the stock.

After a steer is thus properly trained, it will be advisable, for the future, to match such as are intended to draw in the same team, or yoke: attention being paid to their size, strength, and spirit or temper; otherwise, by being unequally matched, they will not only spoil their work, and be greatly disqualified for draught, but the slower or weaker animal of the two being urged beyond its natural powers, will inevitably receive material injury.

* Malcolm's "Compendium of Modern Husbandry," Vol. 1. p. 354. The practice is admirably adapted for fattening calves for the butcher; for which quietude is absolutely requisite: but where the object in rearing them is to keep them, as stock, it probably will be found more conducive to their health to turn them out into a sheltered paddock or yard, only housing them at night.

† See Book II. Chap. IV. Sect. 3.

‡ Aiton's Dairy Husbandry, Chapter III. Sect. 1. p. 60.

* In Devonshire, however, they are frequently put to gentle work at two years of age.

Another circumstance of essential importance in breaking-in young oxen is, that, when first put to work, whether at the plough or in teams for draught, they be not fatigued, or overheated. Till they are thoroughly trained, therefore, it will be necessary to employ them in labor only at short intervals; to indulge them with rest during the noon-day heats of summer, and to feed them with good hay, which, in this case, is preferable to grass. In fact, while oxen are worked, they must be kept in good condition and spirits, by moderate, but wholesome sustenance. Further, on their return home from labor, it will greatly contribute to preserve their health, if their feet be well washed previously to leading them into their stalls; otherwise diseases might be generated by the filth adhering to them; while their hooves becoming soft and tender, would necessarily disable them from working on hard or stony soils. The extremes of heat and cold ought also to be carefully guarded against, as disorders not unfrequently arise from excess of either temperature; and they are peculiarly exposed to fevers and the flux, if chased, or hurried, especially in hot weather.

The following mode of training and working oxen, which has been successfully adopted in North Britain, we give in the words of the farmer by whom it is practised.

"Out of my stock of cattle," says he, "I select, when two years old, (that is, after harvest, when they are rising three,) four of my stoutest, best shaped stots from the field. These, to accustom with harness, I bind up in my oxen byre every night, for a week or two; and they are then taken out in pairs, and put into the plough with a pair of older trained oxen yoked before them. This keeps them steady, and prevents their running off. After being yoked in this manner two or three times, I turn them again amongst the cattle in the straw-yard, where they remain until spring. They are then three years old. I yoke them all four, after training them as above stated, in a plough by themselves, which requires a little boy to drive; and in that way they are used until four years old, when they are worked in pairs as horses, by one man only, and do the same work at ploughing; for at carting, &c., I never use them, having as many horses as do that part of my work. When used in pairs, one man works two yokings, and the cattle only one each. If, however, I had occasion for two cattle-ploughs, each pair might work well two yokings, the same as horses."

The same intelligent correspondent also remarks, in addition to the above: "if, when three years old, eight stots were worked, four and four *alternately*, it would be a great relief; and I have uniformly found that cattle *moderately worked* thrive better than those that are idle, or unemployed."*

The following system of a succession of breeding and working cattle has been recommended by that eminent agriculturist Mr. Ellman, of Glynde, in Sussex:—the numbers depending, of course, on the means or inclination of the breeder:—

14 calves; of which, nine male; eight for oxen, and one allowed for accident, or not taking to work.

14 year-olds.

14 two year olds; of which eight worked a little at two years and a half.

14 three year olds; part of which taken for cows, and others, if not good, fattened.

14 four year olds; eight worked.

14 five year olds; do.

14 six year olds; fattened.

Thus twenty-four oxen are worked in common; eight, three; eight, four; and eight five years old; and a reserve is kept for breeding cows, and accidents.*

The details of the Earl of Egremont's system, as followed to a great extent at Petworth, are as follows:—

The calves are dropped from December to the end of February; they are weaned immediately, never letting them suck at all, but the milk given for a few days as it comes from the cow. But for weaning on skim milk, they ought to fall in December, or a month before and after, and should then be kept warm by housing; and thus they will be equally forward with calves, dropped late in the spring, that ran with the cow. With the skim milk some oatmeal is given, but not till two months old, and then only because the number of calves is too great for the quantity of milk; water and oatmeal are therefore mixed with it to make it go farther. But to this, heifers with their first calves are exceptions: for they do not become good milkers if their calves are not allowed to suck for the whole season; with the second they are treated like the rest. In May the calves are turned to grass; the first winter, from the beginning of November, they are fed upon rowen, or, as it is in some places called, aftermath. The following summer they are at grass; the second winter on straw, with a turn on short rough grass: they have been tried on hay alone, but straw and grass do better. The following and every other summer on grass, and are broke-in at Christmas, being then three years old, but are only lightly worked until the spring, when their real labor begins. From this time their winter food is straw, with a ton and a half of clover hay from the beginning of January. They are previously kept on straw alone, yet are worked three days in each week.

The breed is Hereford, Sussex, Devon, and a mixed breed between Hereford and Sussex. The Herefords are the best, when pure, for the combined objects of working and fatting; but the mixture of half Hereford and Sussex are nearly equal.†

The general character of the ox is, patience and tractability, though young steers sometimes prove refractory and vicious, which, however, is in most instances the result of defective management, or of bad treatment when first broken for the yoke. When, therefore, an ox is unruly or stubborn, it will be advisable to keep him till he is hungry; and, when he has fasted long enough, he must be made to feed out of the hand. On his returning to labor he should be tied with a rope; and, if he at any time become refractory, gentle measures should be adopted, as above described, in order to bring him to work readily and quietly.

In *working oxen* to advantage, much depends on the mode of harnessing them, and the question, "whether it is most advantageous to yoke oxen by the head or by the collar?" has occasioned much

* See Agricultural Survey of Sussex, p. 261.

† Ibid 263.

discussion, and is even yet undetermined. The prejudice throughout Great Britain is, generally speaking, decidedly in favor of the collar; but throughout Spain and Portugal, where oxen are the only animals employed in agricultural labor, whether of road or field draught, they are invariably yoked by the head. The strength of the animal, indeed, lies in his neck, of the power of which, the yoke affords him all the advantage, while the collar deprives him of it, as he does not draw by the shoulders. The far greater cost and trouble of harness, than of yokes and bows, are also considerations of moment; and in summer, harness has been found an incumbrance, the ox requiring all the relief and liberty that can be given in hot weather.

In Portugal, these animals are harnessed in the following manner; a long leather strap is wrapped round the yoke, whence it passes round the lower part of the horns, and is again fastened to the yoke. By this contrivance, the heads of the oxen become more steady while performing their work, and these useful animals are rendered more tractable. In France, and in the Peninsula, oxen are yoked in a manner which is better expressed by the aid of figures than by description. Plate 1, figure 1, therefore, represents a view of the hinder part of the head and neck of these animals in the yoke, as they appear to a spectator; and figure 2 exhibits a front view of the upper part of their heads, in order to convey a more accurate idea of the mode in which the French oxen are fastened to the bow. We understand that the Earl of Shannon introduced this method of yoking oxen into Ireland, and that two oxen thus harnessed were enabled, with great ease, to draw the enormous weight of three tons.

The advocates for the collar insist upon the advantages of single-ox-carts; and of ploughing with the team at length, by which, as they walk in the furrow, the land is not so much subject to be poached as when they are yoked abreast. They affirm, also, that the pace is quicker in harness; and that the animal works with greater ease. But their opponents allege, that oxen are more advantageously worked in couples than singly, inasmuch as that, being nearer to the draught, they possess greater power over it than when drawing at length: they consider the additional expense occa-

sioned by a double number of one-ox-carts and drivers, as more than counterbalanced by; any advantage, even if any were admitted, in their use; and they deny that the animal works either quicker or with greater ease.

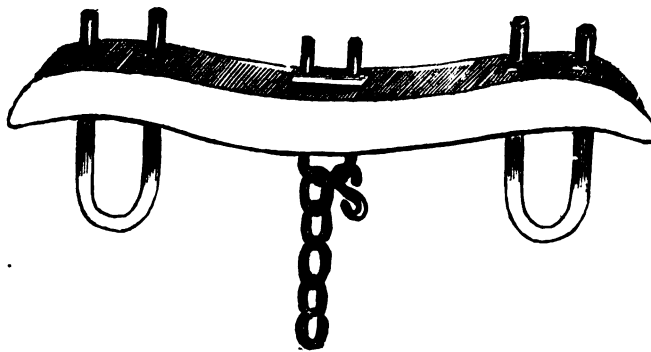
It would be endless to detail the various comparative trials that have been published on this long contested subject; and it may be deemed sufficient to state the result of two, made, some years ago, in Sussex; where, from oxen being extensively used, the dispute has excited more than common interest.

In order to decide the respective merits of the two methods, it was agreed, that an acre of land should be ploughed by two teams, the one of six oxen in double yokes, the other of four oxen in collars; and then, again, with four oxen in single yokes, against four in collars. In the first trial, the six in yoke beat the four in collar easily; and in the second, there were only three minutes difference. The work was equally well performed; but the ploughing must have been very light, as the last match was completed in four hours and ten minutes.*

So far as this experiment may be considered decisive, it re-established the equality of the teams; but had it been tried by more severe labor, or on hilly ground, it might have proved different; and in steep ascents, more particularly, the yoke would probably have been found best adapted to the animal. It is a prevalent idea in England, that oxen are unfit for draught in hilly countries; but a large portion of the Peninsula is mountainous, and there they draw heavy weights in carts of a very rude construction. Being worked in yokes, they possess the power of preserving the line of draught, by lowering the head according to the inclination of the ground, an advantage which is lost in the application of the collar; and their chief strength is, besides, supposed to depend on the joint power of the neck and the base of the horn.

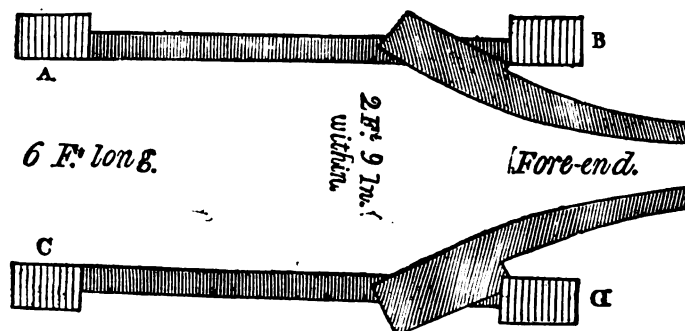
Lord Egremont has also worked his cattle each way, at Petworth, in both road and field labor, and his Lordship's experience confirms the opinion in favor of the old Sussex yoke, of which the following is a figure.

* See Agricultural Survey of Sussex, p. 243.



Connected with the subject of draught is another, which has only received, of late years, that attention which it required, viz. the *shoeing of oxen*; a necessary operation, which, when carefully executed, will not only conduce to the animal's comfort and health, but also to the farmer's profit; as he will thus be enabled to draw both with greater speed and with superior effect. According to the common practice, the animal is first *cast*, or thrown, and his legs bound together in the usual manner; he is then forced nearly upon his back, and his feet are hoisted up to a convenient height by means of a forked pole, the forked end taking the bandage that binds the feet, while the opposite end is firmly fixed in the sward upon which they

are thrown: the farrier then proceeds to affix the shoes in a manner similar to that practised on horses. By this simple contrivance, the operation acquires great firmness, steadiness, and convenience; but it is attended with disadvantage, as accidents sometimes occur in the operation of casting: the other oxen are also apt to become unruly on seeing their companions roughly treated, and thus many valuable cattle are often rendered completely useless. To obviate such accidents, an ingenious machine of great simplicity has been long in use at the late Mr. Bakewell's farm at Dishley. It merely consists of four posts A, B, C, D, fixed firmly in the ground with strong side-rails, thus:—



The animal being led in, is confined by four broad straps going over the back and under the belly; the two projecting benches are hollowed on the top, for laying on the fore legs one at a time; the hind legs are severally held out, when wanted, by a long wooden lever; and thus the shoes are applied without any possibility of injuring the beast. It has, indeed, been suggested, (and we think the plan might be easily carried into effect,) that if calves, intended to be reared for work, were accustomed, while young, to have their feet taken up, and their hoofs beaten with a hammer, and this practice repeated during the winter, while the steers are in the yards, they might afterwards be shod in the same manner and with equal facility as horses.*

Of grazing neat cattle.

The feeding and fattening of cattle, whether for labor or for sale, is the most important in the whole economy of the grass farm: hence the farmer should previously consider the *nature* and *fertility* of his *pastures*, and the extent and quality of his other resources; and, according to these, he ought to regulate his system of *grazing*, *soiling*, or *stall-feeding*. He should then select those beasts only which evince the most *thriving disposition to fatten with the least consumption of food*, and depasture them upon such lands as are best calculated for the respective breeds; especially taking care not to bring cattle from rich to inferior soils, but, wherever it is practicable, to choose them from lands of nearly the same quality as those destined for their reception: beside which

precautions, it is proper in all situations which are not provided with wholesome water, to avoid selecting cattle from those districts where it abounds in a state of purity.

The introductory view of breeds prefixed to this work, will probably supply some hints for enabling the farmer to decide what sort of stock is calculated for peculiar situations; in addition to which we would observe, generally, from the practice of the most eminent graziers, that the larger beasts are preferable for the more luxuriant pastures; while, in such as are less rich, small stock answer best. Thus, a grazier who has fertile meadow, or deep marsh, may select his beasts as large as he can find them; but he who has only indifferent grass, should take care to proportion the size of his beasts to the goodness of their pasture; for it is preferable to have cattle rather too small than too large for the quality of the land. Hence we find, that in the rich grazing counties of Durham and Lincoln, large breeds are chosen, while in Norfolk and Suffolk, the kyloes and galloways are fattened preferably to any other breeds, not alone on account of their superior kindness, and the excellence of their flesh, but from the stock being better suited to the lightness of the soil. Next to these, in the esteem of salesmen, is the dark red variety of the Devonshire sort, which chiefly prevails in the counties of Leicester, Oxford, Somerset, and Warwick; to these may be added the Glamorgan, Hereford, and Suffolk polled breeds of cattle, all of which are eminently profitable in particular situations. But, in order to carry on the grazing of cattle with effect, it is necessary that the grazier form a complete plan, or system, and proceed regularly therein, deviating from it in those instances only which obviously tend to improve his course, and ultimately to increase his profits.

* On the working and shoeing of cattle, see Chap. VIII. No. 5 on "British Husbandry," in the Farmer's Series of the Library of Useful Knowledge.

With regard to the species of cattle best calculated for grazing, spayed heifers and oxen are certainly superior to any other stock; the former, indeed, are of less frequent occurrence, though they fatten with more expedition. Many graziers consider heifers more kindly in their disposition to feed than steers; particularly when they have already had a calf; and Mr. Honeybourne, the respectable successor of Bakewell, at Dishley, is of opinion that they are superior to oxen for fattening at any age, and that they will produce a greater weight of beef per acre.* Wintering heifers in calf, in some grazing districts termed *incalvers*, may also be advantageously fattened, if attention be paid to selection, and the beasts are well fed during the winter, on rich succulent crops; they are occasionally sold for small sums at the autumnal or Michaelmas fairs, and may be disposed of in the succeeding spring, with their calves running by their side, to considerable profit. *Free Martins*, or barren cows, have also been tried for the purpose of fattening, but they rarely succeed. This is also the case with old cows, and such as are become dry, which may, in a few instances, prove a source of profit, but are for the most part hazardous, and much inferior to young or middle-aged stock, in point of *kindliness to fatten*. Such cows have been found to fatten more readily after they have taken the bull, than when barren.

In stocking lands, as the proportion of beasts must depend upon the fertility of the soil, it will generally be found that local custom, which is usually the result of experience, will afford the surest guide. In the counties of Somerset and Devon, one acre, or one acre and a half of the richer kinds of land, are allotted to one ox, to which a sheep is sometimes added: but fertile as those districts are, they are surpassed by the richer grounds of Lincolnshire, the best of which will support one ox and fourteen large sheep on two acres during the whole summer, and five sheep on a similar space of land in the winter, or sixteen sheep on one acre throughout the summer. Instances have indeed occurred, in which one hundred and ten Lincolnshire sheep, and fifteen large bullocks of the same breed, have been fattened on fifteen acres, the last-mentioned animals having been put to spring grass out of the straw-yard, and fattened to the weight of 1,130 pounds by the ensuing Michaelmas.

In order to graze cattle to advantage, it will be profitable to change them from one pasture to another, beginning with the most inferior grass, and gradually removing them into the best. By this expedient, as cattle delight in variety, they will cull the uppermost or choicest part of the grass, and by filling themselves quickly, as well as by lying down much, they will rapidly advance towards a proper state of fatness; while the grass, which is thus left, may be fed off with laboring cattle, and lastly with sheep. Hence it will be advisable to have several inclosures, well fenced and sheltered, and abundantly supplied with wholesome water. Respecting the best size for such inclosures, there is a difference of opinion; from ten to fifteen or twenty acres, perhaps, is the most appropriate; though, if any be of a greater extent than this, they may be divided by a strong, but temporary fence for this purpose. Their size,

however, should be various, as small ones are preferable in winter, and larger ones during the summer. Thus the greatest and strongest cattle will be separated from the weaker ones; for, if cattle of various sizes are indiscriminately mingled together, the more powerful beasts will master the others, driving them from place to place, and trampling upon or wasting more food than they can eat.

To prevent these inconveniences, and also to stock the land to the greatest advantage, some intelligent graziers recommend the following method of feeding and fattening cattle. Suppose there are four inclosures, one ought to be kept perfectly free from stock till the grass is in its full growth, when the prime, or fattening cattle should be put into it, that they may get the best food; the second best should then follow, and the young stock after all, making the whole feed over the four inclosures in the following succession:—

First inclosure. Free from stock, till ready for the best cattle.

Second inclosure. For the reception of the best cattle, till sent to No. 1.

Third inclosure. For the second best cattle, till sent to No. 2.

Fourth inclosure. For the young cattle till sent to No. 3.

Thus the fourth inclosure is kept free from stock till the grass is got up, and it is ready for the prime cattle. To which we will add, that the inclosures should be finally gone over by store sheep; by which they will be eaten down to a close and even sward, to the great benefit of the aftergrowth.

It will also be of service to erect *rubbing-posts* in different parts of the various inclosures, where stock are feeding, as such posts keep the cattle from the fences, and furnish them, no doubt, with an agreeable, and perhaps, a salutary amusement. Some Norfolk farmers draw the crown of a tree, with the lower part of the boughs left on it, into the middle of the close; this is less trouble than putting down a post, is easily rolled and removed, and seems to be still more agreeable to the cattle.*

Before we proceed to discuss the other branches connected with the grazing of cattle, it will not be altogether irrelevant to state a few particulars concerning the peculiar practice, or management of some of the most eminent graziers.

Thus, some farmers purchase *heifers*, and other lean stock, from the month of March or April, to the month of May, and turn them in upon the meadows and pastures as early as possible. Here the beasts become completely fat on the *grass-feed* towards the close of October, or the commencement of November, or perhaps later in the year, according to their kindliness of disposition in taking on fat. In the county of Middlesex, this method is applied with uncommon success, on hay-farms. The graziers in that county purchase small cattle, which are in pretty good condition, as early in the autumnal quarter as the *rouven latter-math*, or after-grass, is ready; into this the beasts are turned, and are sold to considerable advantage about the end of October, or early in the ensuing month of November.

There is another mode practised in some graz-

* See the Agricultural Survey of Leicester, p. 232.

* Marshall's Rural Economy of Norfolk, Vol. II. p. 115, 2nd Edit.

ing districts, where the lean stock are purchased at various periods and of different sizes, so that, as some become fat sooner than others, they may be sent to market in succession. According to the plan of these graziers, the cattle are sometimes kept throughout *two* winters, during the first of which they are not at *full-keep*, but in the following summer they are turned into good grass, and are fattened off in the second winter with the best and most forcing food the farmer possesses. The more common system, however, consists in buying small cattle as early in the spring as the grass affords a good bite, when they are allowed one summer's grass, and are stall-fattened in the ensuing winter.

With regard to the management of pasture grounds, it may be observed, that those which are laid or allowed to rest at Candlemas, may be grazed in the following May; such as are laid in May, may be grazed at Midsummer; those to which rest is given at that season may be grazed at Lammas; while such as are laid at Lammas may be grazed in October, and generally throughout the succeeding winter.

In the grazing of cattle, a variety of circumstances will claim the farmer's attention, in order to conduct his business with regularity, or with profit. Hence he ought to take especial care not to turn his stock out into the pastures in the spring, before there is a *full bite*, or the grass has obtained a sufficient degree of length and maturity; for neat cattle, whose tongues chiefly enable them to collect the food, neither can nor will bite near the ground, unless they are compelled by extreme hunger, in which case, it is obvious they cannot enjoy their feed, and consequently cannot thrive in proportion.

Where beasts are turned into fields, consisting either of clover entirely, or of a mixture of natural and artificial grasses, great circumspection is required, to see that they do not eat so eagerly, or to such excess, as to become blown or hoven, an affection to which cows are more peculiarly liable than any other neat cattle. That disorder, however, may be prevented either by feeding the animals so as to gratify the cravings of appetite before they are turned into the pasture, or by constantly moving them about the field for a few hours after they have been turned in, that the first *ball* at least may sink into their maw before the next be deposited. Should they, notwithstanding, be attacked with that dangerous swelling, they may be relieved by adopting the remedies pointed out in Book VI. Chap. 1.

Although the various grasses of which a pasture is composed ripen at different periods, yet the sward usually attains its greatest luxuriance about Midsummer; and from that time to Lammas it possesses a peculiar sweetness, so that stock may be allowed, during the intervening period, to bite somewhat nearer to the ground. It will, however, be necessary to remove fattening cattle, (as already intimated,) from time to time, into fresh grounds; so that by taking the uppermost and choicest part of the grass, they may feed both expeditiously and thoroughly. The grass left behind them may be fed off first with laboring cattle, and afterwards with sheep. This last-mentioned point cannot be too minutely regarded; for, if cattle be in want, they will lose more flesh in one day than they can possibly gain or recover in three.

Such pastures as lie in fenny or other situations which retain moisture for a long time, ought to be fed off as early as possible, lest sudden or long-continued rains descend, which will not only render the juices of the grass thin and watery, and ultimately putrescent, but which will also materially affect the health and constitution of the animals. To prevent the losses consequent on such accidents, it will therefore be indispensably necessary, daily and attentively to inspect the grazing stock; and if any beasts appear to be affected by eating wet grass, they should be immediately conducted into dry shelter, and fed with hay or straw; or, if they cannot be conveniently removed, they must be driven to the driest spot, and there supplied with *sweet cut grass* and dry fodder.

The *hard* or *light stocking of pasture ground* is a point on which many experienced graziers are by no means agreed. By some it is contended, that pastures ought to be stocked very lightly; alleging, that although much of the produce is thus allowed to run to seed, which the cattle will not eat, and which is consequently trodden under foot, where it is rotted by rain, and thus wasted; yet experience, say the advocates for *light stocking*, evinces that a greater profit will, upon the whole, be thence derived than by any other practice, on account of the superior thriving of the animals.

By others, on the contrary, it is maintained, that the practice of *light stocking* is highly to be condemned; because it not only tends gradually to diminish its produce, but also to encourage the growth of coarse and unprofitable grasses, which materially deteriorate the pastures; and that the *hard stocking* of grass lands, particularly those of a rich quality, is an indispensable requisite of good management. It must be confessed, that the superior fertility of the hard-stocked Lincolnshire pastures tends greatly to corroborate these assertions, which receive further support from the practice of the most experienced graziers in Romney Marsh. It is recommended by a third party, (whose opinion, perhaps, approximates more nearly to the truth,) that *mixed-stock* should be always kept on the same field; for the foul grass, produced by the dung of some animals, will be consumed by others; and as it is well known that different species of cattle prefer different kinds of grass, there is an evident advantage in this practice.

In every field, numerous plants spontaneously spring up, some of which are disliked by one class of animals, while they are eaten by others; and some of which plants, though eaten with avidity at a particular period of their growth, are entirely rejected by the same beasts at another period of their age. Hence, they say, it becomes necessary, not only to have a great variety of cattle in the same pasture, but also a very particular attention is required to augment or diminish the proportions of some of these classes of animals at certain periods of the year; otherwise some part of the produce will run to waste, unless indeed it be hard stocked to such a degree as to retard their thriving.

On this it is, however, to be observed, that where a great variety of animals are allowed to go at large in the same pasture, they rarely feed with that tranquillity, which is necessary to ensure thriving. It frequently happens that one class, or sort of beasts, wishes to feed or to play, while others are inclined to rest; thus they mutually tease and

disturb each other; and this inconvenience is materially augmented, if any sort of *penning*, or confinement, be attempted. Hence it is obvious, that the practice of intermixing various kinds of live stock is productive of evils, which are, in many instances, greater than those resulting from the waste of food intended to be prevented by this practice. There is, indeed, no doubt but that by *hard stocking*, the grass will be kept short, and will consequently be more palatable in general to the animals that eat it, than if it were allowed to grow to a great length; and that even unpleasant patches may thus be consumed; but as animals, which are to be fattened, must not only have *sweet* food, but also an *abundant bite* at all times, in order to bring them forward in a kindly manner, it appears scarcely possible to unite both these advantages with an indiscriminate mixture of stock: it may, therefore, be generally prudent to confine the practice to neat cattle and sheep.

Independently of remedying the inconveniences above specified, a variety of circumstances concur to prove, that the practice of *soiling*, or feeding cattle during the summer with different green and succulent vegetables, which are cut and carried to them; and of *stall-feeding* them in the winter season with dry fodder, in conjunction with various nutritive roots, will in general be highly economical. The former of these modes, in particular, has been but little used till within a few years, and has not been treated with that attention which its importance deserves: hence, we trust, it will neither be inconsistent with the nature of the present work, nor altogether uninteresting to those who are sedulously aiming at the improvement of their lands, if we consider the subjects of *soiling* and *stall-feeding* in the following points of view.

[To be continued.]

ON THE APPLICATION OF STEAM TO PURPOSES OF HUSBANDRY

From the [British] Quarterly Journal of Agriculture, of 1834.

[The article from which the following extracts are taken is not such as might be inferred from its title. It is neither an account of any practical application of steam power to the uses of agriculture, nor an argument in favor of the practicability of any such plans. But assuming it as unquestionable that steam power may be so applied, the application and its effects are treated of as affecting the general and political state of agriculture in England. The statements given of the actual use of steam power to propel carriages on common roads, will be found interesting; and still more so, is the admission of the writer, and the grounds for the admission, that the corn laws of England *must* be repealed. The agricultural interest has heretofore clung to that system of restriction and monopoly, as if the strength and welfare, indeed the existence of the nation, depended on its maintenance—and every agricultural journal has been a mouth-piece to proclaim the absolute necessity of prohibiting the importation of foreign grain. Nor is the change of tone now exhibited in the Journal of Agriculture any evidence of a change of opinion on this subject, but merely a yielding, from necessity, to the strength of the great and increasing

number of their opponents, who contend for "*cheap bread*," and the destruction of the corn laws. The reluctant admission that this must be conceded, coming from an organ of the party which erected and supported this system, is the strongest proof that the days of the prohibitory system in England are numbered, as well as in our own country. The progress of the knowledge of political economy among the higher classes in England, and of intelligence in general among the mass of the people, have given the death blow to the prohibitions on the corn trade. It will not be very long before England may be as much benefited by buying, as we shall be by selling to her, our cheap grain—and as soon perhaps, there will be an end to the equally impolitic and injurious restrictions imposed by our laws on the importation of foreign manufactured commodities. The oppressed portions of both nations have become too well informed to be longer deluded by the interested advocates for restrictions on trade—and are too strong to be thus oppressed, when knowing their wrongs and the sources of them. The friends of free trade may confidently expect to see the practical operation of their doctrines gradually and widely extended—and our country, and the civilized world, released from the fetters of the prohibitory system, which ignorance forged, and avarice and ambition have so long kept firmly riveted.]

At the present moment when the cry for *cheap bread* is waxing louder and louder, and the anti-corn-law party is daily increasing in number and power, it may not be unimportant to call the attention of the Highland Society, and the agriculturists of Scotland, to the great advantages which will arise from the adoption of the cheaper system of husbandry which the application of steam to general purposes of brute animal labor now renders practicable.

During the last twelve months, rapid advancement has been made in locomotive science, and a great change has been effected in its favor upon the public mind. The problem in mechanics, which the whole scientific world clung to as an axiomatic truth, that the periphery of a wheel had not sufficient hold upon the ground to render it an available fulcrum, was experimentally exploded by Gurney, in the year 1825, and, since that time, Dance, Hancock, Smith, Ogle, Macerone, and various others, have, after surmounting personal and mechanical difficulties almost incredible, established, by numerous successful experiments, the possibility of substituting inanimate for animate power.

Without enumerating any of the various performances of those locomotive carriages, upon which, in 1831, after a patient investigation for three months, a Committee of the House of Commons arrived at the conclusion, "that sufficient evidence had been adduced to prove that they can be propelled by steam on common roads, at an average rate of ten miles per hour; that at this rate they have conveyed upwards of fourteen passengers; that their weight, including engine, fuel, water, and attendants, may be under three tons; that they can ascend and descend hills of considerable inclination, with facility and safety; that they are perfectly safe for passengers; that they are not

nuisances to the public; that they will become a speedier and cheaper mode of conveyance than carriages drawn by horses,"—it is sufficient to say that, in the month of September last, Sir Charles Dance's carriage, exclusive of stoppages, ran down to Brighton in five hours and a quarter, carrying fifteen persons, and the following day it returned in four hours and fifty-nine minutes, without any failure of the machinery, and passing on the road two of the light coaches which had started half an hour before it. In October, the success of this trip was farther corroborated by the same carriages plying for hire between Wellington Street, Strand, and Greenwich, running about 250 miles during that time, through crowds of spectators, and conveying upwards of 336 passengers, without accident or impediment of any kind whatever; and, in November, that journey was made in the same carriage, upon the mail-coach line of the Holyhead Road, which enabled a committee of experienced engineers, with the practical and circumspect Telford at their head, to report, "that there can be no doubt that, with a well constructed engine, a steam-carriage conveyance between London and Birmingham, at a velocity unattainable by horses, and limited only by safety, may be maintained, and that it is their conviction that such a project may be undertaken with great advantage to the public."

It is unnecessary to mention the various and successful exhibitions made by Mr. Hancock's steam-carriage, during the six weeks which it plied for hire during the last autumn, between the city and Paddington, and by Colonel Macerone's, during the nearly 2000 miles of trips which it has made. We are speaking of a principle, not of the particular merits of the various engines, nor of relative performances. It is sufficient, therefore, to say that so satisfied are the engineers, and scientific individuals who have taken the trouble to make themselves practically acquainted with the subject of the practicability and importance of this mode of steam communication, that companies to introduce it upon tramways are now forming for "London, Birmingham, and Holyhead," and "London, Bristol, and Plymouth." The former is already so far advanced, that notice has been given to Parliament for leave to bring in a bill. Several other companies are in agitation. In Scotland also, steam-carriages are shortly to be introduced at Edinburgh, Glasgow, Aberdeen, Dundee, &c.

These statements have been made to show that we are warranted by facts for holding that the power of inanimate locomotion is completely gained, and that no physical difficulties any longer exist to postpone its introduction. With regard to the economy of the substitution, though little definitely can be said from the data furnished by working machinery, which has been altered and patched up times without number, still the disbursements made in running the three principal steam-carriages, as detailed in the *Journal of Steam Transport*, show the most favorable case. The outlay and return upon Mr. Hancock's steam omnibus for the six weeks which it plied for hire, showed a clear gain of nearly cent. per cent.; whilst Colonel Macerone, from the expense incurred in working his carriage in trips taken collectively, amounting to about 2000 miles, calculates that even a higher profit will arise upon the capital employed. When it is considered that a tramway of granite can be laid down at

comparatively a trifling expense to a railway of iron; that the tear and wear of machinery upon it will only be one-third greater than the other, whilst the charge for maintenance of road will for years, from the solidity and durability of the material, amount to nothing, it is perhaps not too much to say, after reducing fares a half, and accelerating speed to an extent limited alone by safety, that a clear profit of not less than £50 per cent. will arise upon the capital embarked in steam conveyance. * * *

But though difficulties exist in the minds of agriculturists, who have not turned their attention to the subject, as to the possibility of extending steam to husbandry purposes, no difficulties exist in the opinions of many eminent machinists who have turned their attention to it. We have had conversations with several patentees, who have each assured us, that there are no practical difficulties in the case, provided there was any inducement for them to direct their skill to such a species of machinery. Mr. Phillips' getomic apparatus, the model of which we have seen, though far from being a perfect machine, is yet sufficient to show that a little farther simplification is all that is required to render it such. We are happy to say, that in our notions respecting steam-ploughing, whether as regards its practicability or importance, we are corroborated by a Fife-shire farmer, who, in a letter of the date 24th December, 1833, published in the Fife Herald, remarks, "that at present, when the ingenuity of man is upon the stretch to devise means to abridge human labor, and add to the comforts and intelligence of redundant and still increasing population—when, by our absurd laws, the manufacturer is under the necessity of giving an extravagant price for the first necessities of life—when industry is fettered, and the growing resources of the country are circumscribed, our tenantry wasting their time and means, and crouching under the power of their proprietors, on account of a corn monopoly, I wonder it never struck some of our agriculturists that they might, like manufacturers, endeavor to under-sell their neighbors, and drive them out of the market. I know it will be said, that it is impossible—but what I am going to suggest, is a farther extension of machinery, to assist us in keeping ourselves a-head of our neighbors, and that is the application of steam to the working of ploughs. At present, it requires nearly the half of the product of a farm to pay the necessary expenses, and a great part of that goes to the keeping of horses, harness, &c. Now, if the farmer could get a steam-engine to work his ploughs, harrows, and rollers—thresh and shear his corn—cast his drains, and rid his land of large stones, he would be able to pay his present rent, although there were no corn-laws, and grain one-third cheaper than it is."

We have gone into all this detail, not because we advocate the application of steam to general locomotive purposes, merely from the love of change, without any other reason than that change is the order of the day. No, but because there are numerous weighty, and what ought to be imperative reasons, for the agricultural classes giving this matter their deep and serious attention. From the whole course of events, no man can be so blind as not to perceive, that upon the subject of the corn laws, the agricultural and manufacturing classes are about to come shortly into a fearful collision.

Cheap bread is a thing that our starving and oppressed people must have, either by a cheaper system of cultivation at home, or by importation of corn from abroad. The alternative is the choice between the life and the death of the State. For surely it is madness amounting in degree to theirs whom the ancients conceived were doomed to perish, to suppose that cheap bread, by a method that will ruin our domestic agriculture, will not precipitate the country into that state of social disunion, which the whole tendency of our affairs shows to be in course of progression. Now, let it not be supposed that steam has had nothing to do in maturing this condition. During the last quarter of a century, it has been applied to what may be called *physical* purposes only, i. e. to purposes which has materially abridged manual labor, and multiplied almost indefinitely every species of commodity, whilst it has not been applied to any one purpose that has increased human labor, or saved the consumption, and cheapened the production of food. Consequently there has been a gradual disapproprimation between the necessities and the conveniences of life, until, after nineteen years of peace, and what ought to have proved financial recruitment, it has reached an extent which has unbalanced consumption and production, to a degree which is paralysing all commercial and agricultural transactions, fearfully increasing pauperism and crime, fomenting sedition, and threatening the peace, order, and best interests, social and civil, of society.

The extension of steam to *economic* purposes, i. e. to purposes which will permit the removal of brute labor, will remedy the evils arising from its partial application; for, as we have shown, it will save and cheapen food, and that by a way which, over and above its improvement of internal communication, will improve the coal trade and iron trade, those pillars upon which the prosperity of the country is said to rest, as well as every department of manual industry. Applied exclusively to physical purposes, machinery as yet has, with all its advantages, been attended by evils far from being partial. Extended further to economic purposes, the good that will follow will not be short of universal. Hitherto its abuse, that is to say its former application, alone has been pernicious; now its use, that is to say its latter application, will be commensurately beneficial. Machinery has made goods,—machinery also must make a market. The existing circumstances of society demand this, otherwise all will terminate in convulsion.

In arriving, then at the conclusion, that cheap bread of home growth, by artificial means, will alone prove an effectual remedy for our distress, we are led to say so, not because we are an advocate for *cheap bread*, abstractly considered. On the contrary, it is our belief that it is bread being too cheap already, which is the main cause of the distress which is so prevalent. It is for the benefit of no class or condition in the State, as bitter experience proves, that prices should be—what they now are and have long been—unremunerative. But what we contend for is this, that as all the other producing classes in the State have artificially cheapened the cost of their respective productions, the agriculturists are bound likewise to follow their example, and cheapen theirs. At the present moment, more than two-thirds of the price of wages is spent upon the necessities, and

less than one-third upon the conveniences of life. There is not a laborer in the three kingdoms who does not feed his belly at the expense of his back. This is an evil of no trifling character, for it is one which affects the entire industry of the country; and farther it is one which, for the interest of all parties, ought to be removed without loss of time. In this way alone our agricultural consumers, instead of being cast into idleness and beggary, will have their condition improved, whilst all the other classes will be enabled to double their use of the conveniences of life. In this way the advocates for free trade will procure the market at home, for which to obtain the privilege of searching abroad they are willing to destroy our domestic agriculture.

No, cheap bread we must have, and cheap bread we shall have; but it is neither for our common nor individual interest that we should purchase it by the destruction of our home market. At the present moment, we pay yearly £80,000,000 for the corn which we consume. Of that sum full £30,000,000 go to support the animate brute machinery by which it is reared and transported. Here, then, is a system that requires revision—a repeal which will give us cheap bread, by a mode which will put us in all respects upon the same free trade footing as our continental rivals, besides superadding to all the outlets which our enterprise can find abroad, the best and surest of all markets, that of a new and prosperous one at home. At the present moment, twenty millions of our fellow-subjects may be said to be in the condition of non-consumers. With such a field, then, before us, as the regeneration of our domestic population, shall we omit, or postpone the opportunity which now presents itself, of achieving the formation of a community at home, who can make cheap bread at home, and be so remunerated as to consume prosperously commodities made at home?

Hankering after foreign relations instead of minding the one thing needful, to provide at home that extended consumption which should bear an adequate ratio to extended production, has been the fatal rock upon which the vessel of our common prosperity has split. Owing to this error it is, notwithstanding all our ascendancy in the arts of industry, we have forced our domestic population into a condition which makes vain and desperate all *natural* aids for any purposes which are more than palliating. And now we must retrace our steps, and regenerate society by the *artificial* means which the progress of invention has at length put within our power. The possibility is now given to us to remedy in this way evils, which, situated as the country is, could not have been remedied by any other method. Shall the means then prove wanting? Already the substitution in questions has been retarded for years, from no other circumstance than want of co-operation, and if it be delayed a few years longer, that convulsion may take place, which, through the good providence of God, it seems provided to obviate. Had the application of elementary power contemplated merely a cheaper, quicker, better system of conveyance, we would not have taken up a subject which might tend only to urge it prematurely and improvidently into operation. No, but it is because the removal of brute labor will increase human labor, and cheapen food of home growth, at a moment when the want of these is threatening the peace and

stability of society, that we see a case sufficiently strong to make the nation at large take up the subject as a national measure.

In order more effectually to promote this object, and carry the project extensively into operation, a *national institution of locomotion*, unconnected with any trading company, is now in progress of being formed to promote the application of steam to general purposes of transport and husbandry, and to supply the desideratum which has long been experienced of there being no metropolitan association in connection with the various companies and local societies throughout the united kingdom, formed for the advancement of commerce and agriculture.

We need say nothing of the advantages to arise to our inland transport and navigation, from an institution which shall watch over these important interests, and hold out premiums for improvements in them; neither how beneficial, as regards agriculture, will the existence of an institution be, which will serve for the united kingdom generally the similar important purposes to what the Highland Society is effecting for Scotland.

An institution likewise which shall concentrate genius and science of the country, and where at a glance the public will be able to see all that mind can devise, and ingenuity perfect, for the advancement of our social prosperity, will not fail, if supported as it deserves, to be productive of the most important benefits to the nation. That support, as far as one portion of the union is concerned, we trust it will find in the Highland Society and people of Scotland.

When we consider how exigent is the *want* which steam applied to economic uses is commissioned to alleviate, and how reckless in its consequences, as that volcano indicates whose eruptions are now nightly visible in the farm-yards of some district or other of the country, we consider it fortunate that, if *cheap bread* be wholly unavoidable, it can now be procured in a way that makes it wholly desirable. The bane of having prices reduced by steam transport, and the antidote of providing for the same by steam husbandry, are both before our agriculturists. We cannot suppose that they will allow the one to be introduced unaccompanied by the other. In the hope that this will be the case, we cannot conclude this paper without congratulating all orders of our fellow subjects upon the bright prospects which the general application of steam to brute labor purposes opens upon us. At a moment when the resources of the country are no longer adequate to the wants of our population, "*when a restless spirit of discontent is everywhere abroad*," and cheap food of *home growth* is a *sine qua non* to an ameliorated condition, this beneficent agent steps in to accomplish what could not have been effected by any *external* process whatever. The speedy and general introduction of steam cultivation is all that is required to make cheap bread in Britain, in a way that will reduce no one to destitution in Britain. If our industrious classes must still earn and eat bread by the sweat of their brow, they shall nevertheless eat it in plenty, and in contentment. Under the social economy which the extension of steam to the purposes of animal labor will allow, it shall no longer be said that the wealthiest empire in the world is also the most wretched one, or that, with all our boasted wisdom in science

and art, we are unwise in that which not rightly to know is misery and unhappiness! The better policy of the age of steam must be to make millions rich instead of the units,—to render monopoly the property of the state and not of the stock-jobber,—to comfort a thousand happy homes, instead of building up one bloated capitalist. Steam which, confined to physical purposes, hitherto has wrought such marvels, extended further to economic uses, can achieve all this, for by *home means*, equalizing the price of necessities and conveniences, it *will adjust production and consumption*; the unbalanced condition of which alone has deranged the currency,—paralyzed transaction,—abridged industry; and, in a word, occasioned all these evils which at length have produced a nation divided into usurers and paupers, to the danger alike of the constitution, the altar, and the throne.

R. B.

DIRECTIONS FOR WORKING CAST STEEL.

From the Southern Planter.

Mr. Editor—The knowledge of the enclosed Recipes of Rules for working Cast Steel cost my father, some years ago, \$20. As it may be of use to some of the mechanics among your subscribers, to whom it is not generally known, you are allowed to publish it for their benefit.

J. G.

DIRECTIONS.

Take borax and melt it in an iron ladle until it will run like melted cinders or wax, then pour it into a clean iron plate; let it stand until cold, then pound it to powder, when it is fit for use.

TO MAKE ALL KINDS OF AXES.

Make the head or poll in the common way, and weld the iron firmly where the steel is to be placed; then with a thin chisel split the iron one inch deep in the middle, then heat the iron where it has been split; when hot hammer the iron with the pane of the hammer so that the edges of the iron may be thin on each side of the steel. Then the chisel should be entered once more to open the iron which should be nearly white hot; when opened, some of the powder should be put into the split on both sides; then the steel should be put into the same and the iron gently closed to it, so that the steel will keep its place until the welding heat is taken; put it loosely into the fire, heat it until the steel is red hot, sprinkle on more of the ingredients to prevent the steel from burning; turn it and let it be until a smoke arises, then it is fit for welding. Care should be taken to keep the iron clean, that no particles of coal or dust come between it and the steel. The edge of the axe should run past the *teu* iron, and be raised a little above a level.

RULE FOR TEMPERING TOOLS.

All tools should be heated slow and regular, for hardening, say to a dark red, or as low as will take a sufficient degree of hardness. Take one gallon of salt to six gallons of water.—Temper your tools in this water.

FOR AN AXE.

Draw the temper to a Pigeon red, then cool it.

FOR CUTTING STONE.

Draw the temper to a deep straw color.

FOR TEMPERING COLD CHISELS.

Draw the temper from the heat of the chisel to a deep blue.

FOR TEMPERING KNIVES AND SPRINGS.

Knives temper in damp oil. Then draw the temper from the heat of a bar of iron by degrees, until you get it to a deep blue. Springs are to be tempered in oil, then to be oiled over, and the oil burnt off three different times over the blaze of the fire.

FLAGG'S SHINGLE MACHINE.

A machine for riving and drawing shingles, has been recently brought into use in New York of which the inventor makes the following statement in the last New York Farmer.

It is one of the greatest labor saving machines in this country; it performs its work to great perfection, and at a rate almost incredible to all who have not seen it. It is very simple in its construction, and not liable to get out of order. By this machine sixty shingles are made from the bolt or block in one minute, being one a second, and more perfect than can be made with a frow and drawing knife, as they are usually made. The shingles are of a true taper from butt to point, and can be shaved to any given thickness. Any timber that can be split with a frow can be worked with this machine: pine, cypress, cedar, chestnut, oak, ash, hemlock, or any timber that will rive or split.

ON THE GENERATION OF INSECTS.

From *Insect Transformations* in the Library of Entertaining Knowledge.

It was universally believed by the ancient philosophers, that maggots, flies, and other insects, were generated from putrifying substances. This opinion continues to be held by uninformed persons among ourselves;—though it would be equally correct to maintain, that a flight of vultures had been generated by the dead carcass which they may be seen devouring, or a flock of sheep from the grass-field in which they graze. Another opinion, perhaps still more generally diffused, is that caterpillars, aphides, and other garden insects which destroy the leaves of plants, are generated, propagated, or, at least, spread about by certain winds or states of the air, mysteriously and indefinitely termed *blight*. The latter belief is, probably, not so easy of immediate refutation as the former;—but, as we shall endeavor to show, it seems to us to be equally erroneous.

The small size of insects renders it somewhat easy to pass off fanciful opinions regarding them, since it is difficult for common observers to detect mistakes; but similar notions have been entertained by writers of no mean reputation, respecting even the larger animals. The celebrated Kircher, for example, one of the most learned men of the seventeenth century, goes so far as to give the following singular recipe for the manufacture of snakes:—

"Take some snakes," says he, "of whatever kind you want, roast them, and cut them in small pieces, and sow those pieces in an oleaginous soil; then, from day to day, sprinkle them lightly with water from a watering-pot, taking care that the piece of ground be exposed to the spring sun, and in eight days you will see the earth strewn with little worms, which, being nourished with milk diluted

with water, will gradually increase in size till they take the form of perfect serpents. This," he subjoins with great simplicity, "I learned from having found in the country the carcass of a serpent covered with worms, some small, others larger, and others again that had evidently taken the form of serpents. It was still more marvellous to remark, that among these little snakes, and mixed as it were with them, were certain flies, which I should take to be engendered from that substance which constitutes the aliment of the snakes*."

Kircher's more shrewd and less fanciful correspondent, Redi, determined to prove this singular recipe before he trusted to the authority of his friend. "Moved," he says, "by the authentic testimony of this most learned writer, I have frequently tried the experiment, but I could never witness the generation of those blessed snakelets made to hand." But though Redi could not, in this way, produce a brood of snakes, his experiments furnished an abundant progeny of maggots,—the same, unquestionably, that the imagination of Kircher had magnified into young snakes,—which, being confined in a covered box, were in a short time transformed into flies, at first of a dull ash color, wrinkled, unfinished, and their wings not yet unfolded,—as is always the case with winged insects just escaped from their pupa case. In less than an hour, however, they "unfolded their wings and changed into a vivid green, marvelously brilliant"—most probably the green flesh-fly (*Musca Caesar*. LINN.)

It is a common opinion in this country, particularly in the north, that if a horse's hair be put into the water of a spring or ditch, it will be in process of time transformed, first into a hair-worm, and afterwards into an eel. The deception, as in the instance of Kircher's snakes, arises from the close resemblance between a hair and the hair-worm (*Gordius aquaticus*, LINN.), and between this and a young eel. This fabled transformation of hair, which we have heard maintained, even by several persons of good education, is physically impossible and absurd.

The method laid down by Virgil in his *Georgics* for generating a swarm of bees is precisely of the same description as the snake recipe of Kircher; and though the "Episode of Aristæus recovering his bees" has been pronounced to be "perhaps the finest piece of poetry in the world," we must be permitted to say that it is quite fabulous and unphilosophical. The passage runs thus:—

Oft from putrid gore of cattle slain
Bees have been bred. * * * A narrow place,
And for that use contracted, first they choose,
Then more contract it, in a narrower room,
Wall'd round, and cover'd with a low built roof,
And add four windows, of a slanting light
From the four winds. A bullock then is sought,
His horns just bending in their second year;
Him, much reluctant, with o'erpow'ring force
They bind; his mouth and nostrils stop, and all
The avenues of respiration close;
And buffet him to death: his hide no wound
Receives; his batter'd entrails burst within.
Thus spent they leave him; and beneath his sides
Lay shreds of boughs, fresh lavender and thyme.
This, when soft zephyr's breeze first curls the wave,
And prattling swallows hang their nests on high.

* Athan. Kircher, *Mund. Subterr. lib. xii.*

† Redi, *Generat. Insectorum*, edit. Amstel. 1686.

Meanwhile the juices in the tender bones
Heated ferment; and, wond'rous to behold,
Small animals, in clusters, thick are seen,
Short of their legs at first: on filmy wings,
Humming, at length they rise; and more and more
Fan the thin air; 'till, numberless as drops
Pour'd down in rain from summer clouds, they fly.

TRAPP'S VIRGIL, Georg. iv. 369.

Columella, a Roman writer on rural affairs, after directing in what manner honey is to be taken from a hive by killing the bees, says, that if the dead bees be kept till spring, and then exposed to the sun among the ashes of the fig-tree, properly pulverised, they may be restored to life.

These fancies have evidently originated from mistaking certain species of flies (*Syrphi*, *Bombylis*, &c.) for bees, which, indeed, they much resemble in general appearance, though they have only *two* wings, and *short* antennæ, while all bees have *four* wings, and *long* antennæ. Neither the flies nor the bees are produced by putrefaction;—but as the flies are found about animal bodies in a state of decomposition, the ancients fell into an error which accurate observation alone could explode. The maggots of blow-flies, as Swammerdam remarks, so often found in the carcasses of animals in summer, "somewhat resemble those produced by the eggs of bees. However ridiculous," he adds, "the opinion must appear, many great men have not been ashamed to adopt and defend it. The industrious Goedart has ventured to ascribe the origin of bees to certain dunghill worms,* and the learned De Mei joins with him in this opinion; though neither of them had any observation to ground their belief upon, but that of the external resemblance between bees and certain kinds of flies (*Syrphidæ*) produced from those worms. The mistake of such authors should teach us," he continues, "to use great caution in our determinations concerning things which we have not thoroughly examined, or at least to describe them with all the circumstances observable in them. Therefore, although this opinion of bees issuing from the carcasses of some other animals by the power of putrefaction, or by a transposition of parts, be altogether absurd, it has had, notwithstanding, many followers, who must have in a manner shut their eyes in order to embrace it. But whoever will attentively consider how many requisites there are for the due hatching of the bee's egg, and for its subsistence in the grub state cannot be at a loss for a clue to deliver himself out of that labyrinth of idle fancies and unsupported fables, which, entangled with one another like a Gordian knot, have even to this day obscured the beautiful simplicity of this part of natural history."†

Redi was by no means satisfied with the first results of his experiments upon the flesh of snakes, for several species of flies were produced, giving some countenance to the opinion of Aristotle, Pliny, Mouffet, and others, that different flesh engenders different flies, inheriting the disposition of the animal they are bred from. He accordingly tried almost every species of flesh, fish, and fowl, both raw and cooked, and soon discovered (as he

could not fail to do) that the same maggots and flies were produced indiscriminately in all. This ultimately led him to ascertain that no maggots are ever generated except from eggs laid by the parent flies: for when he carefully covered up pieces of meat with silk or paper sealed down with wax, no maggots were seen; but the parent flies, attracted by the smell of the covered meat, not unfrequently laid their eggs on the outside of the paper or silk, the maggots hatched from these dying of course, for want of nourishment.

With respect to bees, it becomes even more absurd to refer their generation to putrefaction, when we consider that they uniformly manifest a peculiar antipathy to dead carcasses. This was remarked so long ago as the time of Aristotle and of Pliny,* and Varro asserts that bees never alight upon an unclean place, nor upon any thing which emits an unpleasant smell. This is strikingly exemplified in their carrying out of the hive the bodies of their companions who chance to die there; and in their covering over with propolis the bodies of snails, mice,† and other small animals which they cannot remove.‡

* Aristotle, Hist. Animal. ix. 40. Pliny says, "Omnes carne vescuntur, contra quam apes, quæ nullum corpus attingunt."
† Huish on Bees, p. 100.
‡ Insect Architecture, p. 109.
§ The Cicadæ do not deposite their eggs in the earth, but on trees, &c. See *Insect Architecture*, chap. vii.
¶ Multaque nunc etiam existunt animalia terris, Imbribus et calido solis concreta vapore.
De Nat. Rer. v. 795.
|| Robinet, Consid. Philosophiques de la Gradation Naturelle des Formes de l'Etre. Paris, 1768.

But the ancients, it would appear, had the shrewdness seldom to venture upon illustrations of their philosophical romances by particular examples. This was reserved for the more reckless theory-builders of our own times. We find Robinet, for example, asserting that, as it was nature's chief object to make man, she began her "apprentissage," as he calls it, by forming minerals resembling the single organs of the human body, such as the brain in the fossil called Brain-stone (*Meandrina cerebriformis*, PARKINSON.)|| Darwin, again, taking the hint from Epicurus, dreams that animals arose from a single filament or threadlet of matter, which, by its efforts to procure nour-

* The maggots of *Eristalis tenax*, FABR. *E. apiformis*, MEIGEN, and other *Syrphidæ*, well known in common sewers by their long tails, like those of rats.

† Swammerdam. Book of Nature, i. 228.

ishment; lengthened out parts of its body into arms and other members. For example, after this filament had improved itself into an oyster, and been by chance left dry by the ebbing of the tide, its efforts to reach the water again expanded the parts nearest to the sea into arms and legs. If it tried to rise from its native rocks, the efforts produced wings, and it became an insect, which in due course of time improved itself by fresh efforts till it became a bird, the more perfect members being always hereditarily transmitted to the progeny. The different forms of the bills of birds, whether hooked, broad, or long, were, he says, gradually acquired by the perpetual endeavors of the creatures to supply their wants. The long-legged water-fowl (*Grallatores*, *Vigors*) in this way acquired length of legs sufficient to elevate their bodies above the water in which they waded. "A proboscis," he says, "of admirable structure has thus been acquired by the bee, the moth, and the humming-bird, for the purpose of plundering the nectaries of flowers."* Lamarck, an eminent French naturalist, recently deceased, adopted the same visions; and, among other illustrations of a similar cast, he tells us that the giraffe acquired its long neck by its efforts to browse on the high branches of trees, which, after the lapse of a few thousand years, it successfully accomplished.

Theories like the preceding all originate in the endeavors of human ingenuity to trace the operations of nature farther than ascertained facts will warrant; and the necessary blanks in such a system, which presupposes much that cannot be explained, are filled up by the imagination. This inability to trace the origin of minute plants and insects led to the doctrine of what is called spontaneous or equivocal generation, of which the fancies abovementioned are some of the prominent branches. The experiments of Redi on the hatching of insects from eggs, which were published at Florence in 1668, first brought discredit upon this doctrine, though it had always a few eminent disciples. At present it is maintained by a considerable number of distinguished naturalists, such as Blumenbach, Cuvier, Bory de St. Vincent, R. Brown, &c. "The notion of spontaneous generation," says Bory, "is at first revolting to a rational mind, but it is, notwithstanding, demonstrable by the microscope. The fact is averred: Muller has seen it, I have seen it, and twenty other observers have seen it: the *Pandorinia* exhibit it every instant.†" These *pandorinia* he elsewhere describes as probably nothing more than "animated scions of *Zoocarpæ*" (*propagules animées des Zoocarpes*.‡) It would be unprofitable to go into any lengthened discussion upon this mysterious subject; and we have great doubts whether the ocular demonstration by the microscope would succeed except in the hands of a disciple of the school. Even with naturalists, whose business it is to deal with facts, the reason is often wonderfully influenced by the imagination.

But the question immediately before us happily does not involve these recondite discussions; for if even *pandorinia* and other animalcules were proved

beyond a doubt to originate in the play of chemical affinities or galvanic actions—(a more refined process, it must be confessed, than Kircher's chopped snakes,) it would not effect our doctrine that all insects are hatched from eggs: for no naturalists of the present day classes such animalcules among insects. Leaving animalcules and zoophytes, therefore, out of the question, we have only to examine such branches of the theory of spontaneous generation as seems to involve the propagation of genuine insects,—like the fancies about putrefaction which we have seen refuted.

The notion that small insects, such as aphides and the leaf-rolling caterpillars, are spread about or rather generated, by what is termed *blight* (possibly from the Belgic *blinkan*, to strike with lightning,) is almost universally believed even by the most intelligent, if they have not particularly studied the habits of insects. Mr. Main, of Chelsea, an ingenious and well-informed gardener and naturalist, describes this as an "easterly wind, attended by a blue mist. The latter is called a blight, and many people imagine that the aphides are wafted through the air by this same mist.*" "The farmer," says Keith, "supposes these insects are wafted to him on the east wind, while they are only generated in the extravasated juices as forming a proper nidus for their eggs.†" A more detailed account, however, is given by the late Dr. Mason Good, and as he speaks in part from personal observation, and was not only one of the most learned men of his time, but an excellent general naturalist, his testimony merits every attention:—

"That the atmosphere," says Dr. Good, "is freighted with myriads of insect eggs that elude our senses, and that such eggs, when they meet with a proper bed are hatched in few hours into a perfect form, is clear to any one who has attended to the rapid and wonderful effects of what, in common language, is called a blight upon plantations and gardens. I have seen, as probably many who read this work have also, a hop-ground completely overrun and desolated by the *aphis humuli*, or hop greenlouse, within twelve hours after a honey-dew (which is a peculiar haze or mist loaded with poisonous miasm) has slowly swept through the plantation, and stimulated the leaves of the hop to the morbid secretion of a saccharine and viscid juice, which, while it destroys the young shoots by exhaustion, renders them a favorite resort for this insect, and a cherishing nidus for myriads of little dots that are its eggs. The latter are hatched within eight and forty hours after their deposite, and succeeded by hosts of other eggs of the same kind; or, if the blight take place in an early part of the autumn, by hosts of the young insects produced viviparously; for, in different seasons of the year, the *aphis*, breeds both ways. Now it is highly probable that there are minute eggs, or ovula, of innumerable kinds of animalcules floating by myriads of myriads through the atmosphere, so diminutive as to bear no larger proportion to the eggs of the *aphis* than these bear to those of the wren or the hedge-sparrow; protected at the same time from destruction, by the filmy integument that surrounds them, till they can meet with a proper nest for their reception, and a proper stimulating

* Darwin's *Zoonomia*, sect. xxxix. 3d edit. London, 1801.

† Cict. Classique d' Hist. Nat., Art. Microscopiques, p. 541.

‡ Dict. Class., Art. *Pandorinées*.

* Loudon's Mag. of Nat. Hist. i. 180.

† Keith's Physiological Botany, ii. 486.

power to quicken them into life; and which, with respect to many of them, are only found obvious to the senses in different descriptions of animal fluids.*¹²

It appears to us that it can be nothing more than a fancy, which is quite unsupported by evidence, to say that the eggs of *any species* of animalcules or insects float about in the atmosphere; for, independent of their weight, (every known species being greatly heavier than air,) the parent insects of every species whose history has been accurately investigated manifest the utmost anxiety to deposit their eggs upon or near the appropriate food of the young. To commit them to the winds would be a complete dereliction of this invariable law of insect economy. But admitting for a moment this hypothesis, that the eggs of insects are diffused through the atmosphere, the circumstance must be accompanied with two conditions,—the eggs must either be dropped by the parents while on the wing, or be carried off by winds from the terrestrial substances upon which they may have been deposited.

On the supposition that the eggs are dropped by the mother insects while on the wing, we must also admit (for their is no avoiding it) that they continue to float about, unhatched, from the end of the summer till the commencement of spring, at which time only the broods make their appearance. Yet when we consider the rains, snows, and winds, to which they must be exposed for six or nine months, we think the hardest theorist would scarcely maintain that a single egg could out-weather these vicissitudes, and continue to float in the air. It may not be out of place to remark, that the female aphides, which deposit eggs in autumn, have no wings.

Again, on the supposition that the eggs are deposited on plants, trees, or other objects, it is still more unlikely that they could be carried into the air; for, on exclusion, they are, with very few exceptions,† enveloped in an adhesive cement which glues them to the spot on which they are deposited. When eggs are deposited singly, this cement usually envelopes each with a thin coating, as in the instance of the admirable butterfly (*Vanessa Atalanta*;) but when they are placed in a group the cement is sometimes spread over the whole, as in the instance of the white satin moth (*Leucomr salicis*, STEPHENS.) This cement is evidently intended by nature (who seldom accommodates her plans to our theories) to prevent the eggs from being carried from the place selected by the mother insect for their deposition. Those eggs, therefore, which are placed on the outside of substances, have this provision for their secure attachment to the locality chosen by the instinct of the mother. But, on the contrary, the principle does not always hold in the case of those deposited in nests and excavations, and particularly as to those of ants and termites. The working ants, indeed, carry the eggs from the top to the bottom of their galleries, according as the weather is favorable or unfavorable for hatching. The laborers of the white ants (*Termites*;) again, attend their queen with the utmost care when she is laying; for as she cannot then move about, they are

under the necessity of carrying off the eggs, as they are laid, to the nurseries. The extraordinary labor which this requires in the community may be understood, when, according to Smeathman, she lays 60 eggs in a minute, which will amount to 86,400 in a day, and 31,536,000 in a year. The exceptions now mentioned, however, do not in the least invalidate our general position.

Another no less remarkable circumstance is the great weight, or specific gravity, of the eggs of insects. From numerous experiments we may venture to say that those of all the species which we have tried sink rapidly in water the moment they are thrown into it, from the egg of the drinker moth (*Odonestis Potatoria*, GERMAR,) which is nearly as large as a hemp-seed, to that of the rose-plant louse (*Aphis rosæ*;) which is so small as to be barely visible to the naked eye. Some eggs of the gipsy moth (*Hypogymna dispar*, STEPHENS,) indeed, floated in water, because they were covered with down. It is well known, as we shall presently show, that the diffusion of many of the seeds of plants is accomplished by the winged down with which they are clothed; but the down upon the eggs of insects does not conduce to this end. Whether insects' eggs be naked or clothed with down, they are invariably, as far as their history has been investigated, deposited close to or upon substances capable of affording food to the young when hatched. In making experiments upon the specific gravity of eggs, it should be remembered that no infertile or unimpregnated egg will sink; for having some hundreds of these laid by different species of insects reared in our cabinet, we found, upon trial, that they uniformly floated, while those which we knew to be impregnated as uniformly sunk. A female, for example of the rose-leaf roller (*Lozotania Rosana*, STEPHENS) was reared by us, in solitude, under an inverted wine-glass, upon the side of which she glued a patch of eggs, of course, unimpregnated: these, upon trial, all floated in water. But eggs of the same species taken from the outside of a pane of glass close to a rose-tree, all sunk in water; and it is to be fairly presumed, as the parent of the latter was in a state of freedom, that these were impregnated. We found the same distinction, indeed, to hold in the eggs of the drinker moth, the gypsey moth, and numerous other insects.*

Dr. Good's account of "honey-dew," which he describes as "a peculiar haze or mist loaded with a poisonous miasm," that stimulates "the leaves of the hop to the morbid secretion of a saccharine and viscid juice"—appears to us unsupported by facts. Linnæus,† on the contrary, who was not wedded to the meteorological theory of a miasmatic haze, ascribes the honey-dew on the hop leaves to the caterpillar of the ghost moth (*Hepialus humuli*) attacking the roots. Dr. Withering, favoring this account, recommends covering the roots with stones as a preventive; for the caterpillars, he avers, never attack wild hops which grow in stony places, because they cannot get at the roots.‡ It appears to us, however, that there can be little doubt that the sweet syrupy coating, called honey-dew, found on the leaves of the hop, is nothing

*J. R.

†Quoted by Keith, Phys. Bot., ii. 143.

‡Botan. Arrangement, ii., 440, 3d ed.

*Good's Study of Medicine, v. i., p. 339, 3d edition, London, 1829.

†Latreille, Hist. Génér., xiv., p. 342.

more than the excrement of the insect (*Aphis humuli*) whose propagation we are discussing. "The honey-dew," says Loudon, "mostly" (we believe always) "occurs after the crops have been attacked by these insects."* Sir J. E. Smith, who admits this to be the common cause of honey-dew, contends that what is found on the leaves of the beech is an exception; but he adduces no evidence at all satisfactory in proof of its being caused by unfavorable winds;† while the undoubted fact of its being the excrement of aphides in so many other instances‡ weighs strongly against him.

A novel theory of honey-dew has just been published by Mr. John Murray, who ascribes it to an electric change in the air. "Last summer," he says, "we investigated the phenomenon with great care: the weather had been parched and sultry for some weeks previous, and the honey-dew prevailed to such an extent, that the leaves of the currant, raspberry, &c., in the gardens, literally distilled from their tips a clear limped honey-dew, excreted from the plant; for the phenomenon was observable on those plants that were entirely free from aphides, and so copious was it, where these insects were found, that had their numbers been centuple they could not certainly have been the source of the supply. The question with me, however, was set at rest by applying a lens, having previously washed and dried the leaf by a sponge, for in this case the immediately excreted globules became apparent."§

In all observations upon insects, and the other minute parts of creation, it is often exceedingly difficult to distinguish between a cause and an effect. The question of the formation of honey-dew appears to us particularly liable to erroneous conclusions; and we therefore venture to mention a few circumstances which seem irreconcilable with Mr. Murray's ingenious theory. The hop fly (*Aphis humuli*), we think, neither does, nor (for want of appropriate organs) can, feed on the honey-dew; and if it did, this feeding would prove rather beneficial than otherwise to the plant, by clearing it from the leaves whose respiratory functions it obstructs. So far from feeding on diseased plants and aphids only selects the youngest and most healthy shoots, into the tender juicy parts of which it thrusts its beak (*haustellum*), which in some species is much longer than the body, and no more fitted for lapping honey-dew than the bill of *Æsop's* crane was for eating out of a shallow plate. In the experiment, tried by Mr. Murray, of wiping a leaf, might not the leaf have been previously wounded, perhaps, by the beak of some aphid, and hence the exudation of sap, not honey-dew? And may not the circumstances of his finding the honey-dew on leaves where there were no aphides be accounted for on the principle that the aphides had abandoned, as they always do, the parts covered with their ejecta, unless these fell from insects on some over-hanging branch? It is justly remarked by M. Sauvages, that they are careful to eject the honey-dew to a distance from

where they may be feeding.* We have now in our study a plant of the Chinese chrysanthemum (*Anthemis Artemisiae folia*, WILLD.), the young shoots of which have swarmed with aphides all the winter, and the leaves below are covered with honey-dew. We tried the experiment of wiping it off from a leaf, but no more was formed when it was protected by a piece of writing-paper from the aphides above; while the writing-paper became sprinkled all over with it in a few hours. By means of a lens, also, we have actually seen the aphides ejecting the honey-dew.†

The almost instantaneous appearance of these destructive insects in great numbers at the same time, is taken notice of with wonder by almost every writer. This circumstance, it must be confessed, gives considerable plausibility to the notion of their being brought by winds,—for whence, we may be asked, could they otherwise come? Simply, we reply, from the eggs deposited the preceding autumn, which, having all been laid at the same time, and exposed to the same degrees of temperature, are of course all simultaneously hatched. In the case of the aphides, also, the fecundity is almost incalculable. Réaumur proved by experiment, that one aphid may be the progenitor of 5,904,900,000 descendants during its life; and Latreille says, a female during the summer months usually produces about twenty-five a day. Réaumur further supposes, that in one year there may be twenty generations. We ourselves have counted more than a thousand aphides on a single leaf of the hop; and in seasons when they are abundant—when every hop-leaf is peopled with a similar swarm—the number of eggs laid in autumn must be, to use the words of Good, "myriads of myriads." The preservation and hatching of these eggs in the ensuing spring must, it is obvious, depend on the weather and other accidental circumstances, seldom appreciable by our most minute observations.‡

The history of other insects, erroneously referred to blighting winds, is more easily traced, from their being of a larger size than the aphides. The caterpillar, for example, of *Lozotania Rosana*, mentioned before, which rolls the leaf of the rose-tree, is one of this kind. It is well known as furnishing the common poetical comparison of "a worm in the bud." Early in autumn the mother insects deposite an irregularly oval-patch of yellowish eggs, covered with a cement of the same color, sometimes upon the branches of the rose-tree, but more frequently, as we have observed, upon some smooth object contiguous. For several successive seasons, we have found more than one group of these eggs upon the glass panes, as well as the frame-work, of a window, beneath which a rose-tree has been trained. At present (January 1830) there are two of these groups on one pane, and three on the frame-work; and as each contains about fifty eggs, should they all be successfully hatched, two or three hundred caterpillars would at once be let loose, and, streaming down simultaneously upon the rose-tree beneath, would soon devour the greater number of its buds. As this window faces the east, the sudden appearance of the insects would make it appear not unprobable that they had been swept thither by an easterly wind.

*Encycl. of Agriculture, p. 865, s. 5444.

†Introduction to Botany, p. 189.

‡See Linn. vol. vi. and Willdenow, princ. of Botany p. 343.

§Treaties on Atmospheric Electricity, p. 147, Lond. 1830.

†Trans. Soc. Roy. de Montpellier.

*J. R. †J. R.

We found, during the same winter, an extraordinary number of similar groups of the eggs of a leaf-roller (*Loxotania Ribesana?*) on the branches of the gooseberry and red-currant, in a garden at Lee. On some small trees, from two to ten groups of eggs were discovered; and as each group consisted of from thirty to fifty, a caterpillar might have been hatched for every bud. After the severity of the season was over, we had the piece of bark cut off on which these eggs were attached; and though they had been exposed on the bare branches to the intense frosts of 1829-30, they were hatched in a few days after being brought into our study. As the currant-trees were not then come into leaf, we had food to supply them with, and they refused the leaves of all other plants which we offered to them. Had they been permitted to remain on the trees till they were hatched, they would probably have not left a single leaf undevoured. For this spring, at least, these currant bushes will be safe from their attacks, and of course will set at defiance the supposed blighting winds, which no doubt will, as usual, be accused of peopling the adjacent gardens with caterpillars. It may be well to remark, that these caterpillars, when hatched, are scarcely so thick as a thread of sewing silk, and being of a greenish color, they are not readily found on the leaves, the opening buds of which they gnaw to the very core.*

It does not seem to have ever occurred to those who thus speak of insectiferous winds, that they get rid of no difficulty by the supposition; for where, we may ask, is the east or any other wind to take up the insects, or eggs which it is said to drift along? The equally sudden disappearance of insects all at once, which is also popularly attributed to winds, arises from their having arrived at maturity, and fulfilled the designs of Providence, by depositing their eggs for the ensuing season, when they all die, some in a few hours, though others survive for several days, but rarely for weeks.

The sudden and simultaneous appearance of great numbers of frogs, snails, and other land animals, has given rise to the extravagant opinion that they have fallen in a shower from the clouds; and some goodly theories have been devised to account for the probable ascent of frog-spawn, and the eggs of snails, into the atmosphere by whirlwinds. The impossibility of this, in consequence of their specific gravity, is of course left out of consideration by the theorists. Our distinguished naturalist, Ray, when riding one afternoon in Berkshire, was much surprised at seeing an immense multitude of frogs crossing his path, and on looking into the adjacent fields he found that two or three acres of ground were nearly covered with them. They were all proceeding in the same direction towards some woods and ditches, and he traced them back to the side of a very large pond, which, in spawning time, he was informed, swarmed with countless numbers of frogs. He naturally concluded, therefore, that, instead of having been precipitated from the clouds, they had been bred in the pond, from which they had been invited a short time before, by a refreshing shower, to go in quest of food.† Their great numbers will

appear less marvellous, when we consider that a single frog spawns, as De Montbeillard informs us, about 1300 eggs. Were it not, indeed, for their numerous enemies, and their not being fit to propagate till they are three years old, the country would soon be overrun with these reptiles. We have more than once seen a similar legion of hair-worms (*Gordii aquatici*, LINN.) in a garden at Lee, in Kent, every plant and spot of ground literally swarming with them. Their numbers, however, were easily accounted for, as a stream at the bottom of the garden abounds with them, and, like frogs, they appear to be amphibious.

THE LAW OF INCLOSURES.

An act, to reduce into one, the several acts for preventing trespasses; declaring what shall be deemed a lawful inclosure, &c.

1. *Be it enacted by the General Assembly, That*, if any horses, mares, cattle, hogs, sheep or goats, shall break into any grounds, being inclosed with a strong or sound fence, four feet high if made with stone, and five feet high if made with any other materials, and so close that the beasts breaking into the same could not creep through, or with an hedge two feet high, upon a ditch three feet deep, and three feet broad, or, instead of such hedge, a rail fence of two feet and a half high, the hedge or fence being so close that none of the creatures aforesaid can creep through, which shall be accounted a lawful fence: the owner of such horses, mares, cattle, hogs, sheep or goats, or any one of them, shall, for the first trespass so committed, make reparation to the party injured, for the true value of the damage he shall sustain, and for every trespass afterwards, double damages, to be recovered, with costs, in any court of record: *Provided*, That for a third offence, for any one of the beasts aforesaid breaking into such inclosures, it shall be at the election of the party injured to sue for his damages, or to kill and destroy the beasts so trespassing, without being answerable for the same.

2. And, that the condition of the fence, at the time the trespass committed, may be proved to a jury upon trial; *Be it enacted*, That, upon complaint made by the party injured, before any justice of the peace of that county wherein such trespass shall be, such justice is hereby empowered and required to issue his order without delay, to three honest house-keepers of the neighborhood, no ways related to the party injured, nor interested concerning the trespass, reciting the complaint, and requiring them to view the fence where the trespass is complained of, and to take memorandums of the same; and their testimony in such case shall be good evidence to the jury touching the lawfulness of the fence.

3. If any person damnified for want of such sufficient fence, shall hurt, wound, lame, kill or destroy, or cause to be hurt, wounded, lamed, killed or destroyed, by shooting, hunting with dogs, or otherwise, any of the kind or breed of horses, cattle, sheep, hogs or goats, he, she, or they so offending, shall pay and satisfy to the owner of the creature, so hurt, wounded, lamed, killed or destroyed, double damages, with costs; recoverable as aforesaid.

4. All owners of horses, mares, cattle, or other

*J. R.

†Ray's Wisdom of God in the Creation, p. 156.

beasts, which they know to have barked fruit trees, shall keep the same within their own fenced ground; and if any person shall take up any horse, mare, kine, or other beast, known by the owner to have barked fruit trees, and shall deliver the same to such owner, he or she shall pay the taker-up two dollars for every such beast, so taken up and delivered; recoverable with costs, before any justice of the peace of the county, wherein such beast was taken up, or the owner lives: *Provided always*, That the taker-up shall, if required, make oath before the same justice, that he took up such horse, mare, or other beast, and that no means were used by himself, or any other person, to his knowledge, to set the same at large, otherwise he shall lose the said reward.

[The sections of the law which follow the above, relate to other matters, and are therefore omitted.]

A COMMENTARY ON THE LAW OF ENCLOSURES OF VIRGINIA.

For the Farmers' Register.

The agricultural interest of Virginia is already greatly indebted to the Farmers' Register and its correspondents, for commencing and continuing to discuss and expose the evils of the existing law of enclosures—and though it may require a long time to remove all the prejudices, and mistaken opinions, (of which enough will always be found ready to support every evil system of long standing,) still there can be no doubt of the ultimate removal of this burden, which agriculture has placed on its own shoulders. The decree has gone forth for the future destruction of this law—for it cannot resist the attacks of truth, reason and right, which have commenced, and which will not cease until the object in view is attained. Nevertheless, truth and reason have yet to fight a hard battle, and will find stubborn opponents. It will therefore be necessary for those who are convinced of the necessity for a change, to exert themselves, and to expose the deformity and iniquity of our existing policy as to enclosures, in every point of view. To this end, I shall offer some comments upon those provisions of the law which have either been passed over, or but slightly touched upon, by those who have preceded me in this discussion.

The author of the piece signed *Suum Cuique*, (Farm. Reg. Vol. I, p. 396) and several others, have sufficiently exposed the great and main evil of our law of enclosures—the principle itself of the law, which instead of forbidding and punishing wrongful invasions of the farmer's property, requires of him to guard and protect it, or otherwise holds the aggression as justifiable and blameless. This principle, utterly adverse as it is to that of our laws in general, and of justice and the rights of property, is so important in its character and its operation, that it could not be counterbalanced, or justified, by any details or minor provisions of the law, however efficient they might be to secure the remnant of the farmer's right to the product of his land and labor, which the general principle of the law had not swept away. It is therefore not strange, that those who, in the pages of the Farmers' Register, have attacked the principle of the law, have scarcely noticed its particular features, and the utter worthlessness of even those provisions which were intended to operate as a means

of restraining and punishing trespassers. This more humble task I will undertake. The law on the subject, which precedes these comments, will facilitate my references, and permit my remarks to be more concise.

To enable a farmer to recover damages, or obtain any legal redress whatever for injury, or destruction to his growing or standing crops, it is required by the law, that the field should have been enclosed at the time with a "strong and sound fence" of some one of the several kinds described, and of a specified height throughout: and that the field was so enclosed must be proved by the owner as a necessary preliminary step, before he can prosecute his claim for compensation for trespass. The trespasser (if I may dare to apply that term to one whom the law in effect *always* clears of the imputation,) has nothing to prove—the whole burden of proof lies on the sufferer. But suppose, that undaunted by difficulties, and determined to assert the few rights that the law leaves to him, he pursues the remedy offered, and calls for a survey of his fences, according to the provisions of the second section. Now in the first place, (and especially if the farmer is in Lower Virginia, and uses the perishable pine timber which is now the general resource for fencing,) no fence around a large field can be found every where "strong and sound," at twelve months old, even if it is permitted to remain so for twelve days after being built. It may be a fence abundantly good to restrain the owner's stock, or any other animals properly kept—but it is scarcely possible to avoid, from the progress of continual decay alone, some rails being found neither "strong or sound" enough to keep out a mischievous animal, who has been taught by hunger, and the habit of trespassing on neighboring fields for sustenance, to search keenly for all such defective places. But the regular progress of decay in fences, however rapid it may be, does not cause half of this particular evil. Wherever night-walking negroes, or other persons, choose to have a foot path through a field, they will certainly throw down, and keep down, some of the upper rails where they cross the fences—and all the owner's efforts we all know cannot prevent this being done. Any such defect in fences would suffice to prevent the owner's having any remedy or redress for the depredations of mischievous animals.

But suppose that the farmer has managed so well, and been so lucky, that no defect has been produced in his whole line of fence, either by decay, by storms, nor by design or carelessness of any neighbor, black or white—and that trespassing animals, notwithstanding, are found within the field, and that he is able to prove the fact: and that, on these (apparently) sure grounds, he makes complaint, according to law, before a justice of the peace, and obtains the order for the survey of the condition of his fences. These steps cannot be taken within a few hours, nor completed in secret: and even if the fences were perfectly good when the surveyors commenced their examination, the owner of the stock might secretly and safely cause gaps to be made before the survey was finished, and thus procure a condemnation of the fence. But without this, the mere fact that stock had entered the field would be enough to show that they had made the fence, by their entry, otherwise than a "lawful enclosure" at that place:

and unless the breach could be proved to be their act, its existence would serve to justify the trespass.

Even if by possibility neither this nor any of the other obstacles before named, stand in the way of the farmer's obtaining redress, there are still others that will prove sufficiently effectual. For the first offence, he is only permitted to recover the value of the actual damages sustained—and for this purpose the fact of every offence must be fully sustained by proof. Well—the farmer finds hogs in his corn field at earing time, or in his rank wheat just before it is fit to reap. That damage has been done, is unquestionable—and that unless the intruders are speedily removed, it will be enormous, is equally so—but how is it possible to establish by testimony the extent of the damage, and to fix it upon the particular animals that have produced it? The wheat field may exhibit evidence that hogs have concealed themselves under its heavy cover for at least a month, and have caused perhaps damage to the amount of \$50: but how can it be proved that all this was caused by the one or more hogs found and caught at last? Besides, it is most likely that the hogs would not be secured so as to be identified, but would escape, to return and renew their attacks. If any uncertainty existed as to the identity, or the ownership of the animals—or as to whether the damage had been actually committed by them, there could be no redress obtained under the law. If, however, the farmer has a legal witness present, and that witness actually sees a hog tear down and eat six ears of corn, and he can swear to the individual hog, either by his ear marks, or from former personal acquaintance—and the survey is made, and the fence found lawful, *then* all obstacles are at length overcome, and the farmer who has suffered the trespass may recover damages to the amount of the value of *six ears of green corn*: and if (by almost a miracle) he could a second time get through all the like difficulties of proof, with the same trespassing neighbor, and convict him of a similar offence, he would receive as compensation double damages, or the value of *twelve ears of corn*. I doubt, however, whether he would be entitled to double damages, unless it was the same animal that committed the first trespass.

It is difficult to be serious in discussing the pretensions of this law to the character of being remedial, and giving compensation to the sufferer, and adequate punishment to the trespasser. In truth, its provisions offer no redress whatever: they are a solemn mockery of the claims of right and justice, in the details, no less than in the general principle of the law—and it might more truly be entitled "*an act to authorise the trespasses of live stock on the fields of neighboring proprietors, and to prevent all remedy therefor.*" Its actual operation is according to this title and character, and not according to its title in the statute book—for in more than thirty years that I have resided in a part of the country where there has never been a lack of trespassing stock, I have never heard of any resort to the law for damages, nor of any sufferer who even thought of it as a remedy. This fact alone, (and I believe it is general,) is enough to prove that the law in every particular is utterly worthless for the purposes which it *professes* to serve.

It may be asked then, "if the law is so inoperative, how does it happen that fences actually serve

in most cases to protect the crops, and that all fields are not frequently depredated on by the stock of men who are willing to take any privilege that the operation or omission of the law can give?" I answer, and the truth is notorious, that it is not fear of the law that restrains such acts of such individuals, (who, thanks to God, are yet but few in number,) but the fear of public indignation, and perhaps of such damages to their trespassing stock, as are not authorised by law, but which are far more effectual. It is to the general sound moral sense of the community—to the strong perception of right and wrong, and the different effects of this on those who act uprightly or unjustly towards their neighbors, which serve more to restrain trespassers than all the protection promised by the law.

From these views of the particular provisions of the law, and its general disuse, I reach the conclusion, that the law of enclosures is in every respect inoperative—in effect, null and void—except so far as it gives up the property of some individuals to be used or destroyed by others, without the possibility of compensation being obtained, or legal punishment inflicted.

R. N.

BONE MANURE.

From Long Island Star.

This most valuable article is now sufficiently known to be in very great request by the farmers. The mill of Mr. Ogden at Red-Hook, has been at times unable to supply the demand. The mill of Mr. Hornby in New York, has 10,000 bushels on hand, which can be obtained of Mr. Childs, 63 Fulton street, Brooklyn, who informs us that the accumulation of bones in N. York is such, that 800 tons will be sent off in a few days, to manure the soil of Great Britain. Exportation of bones to England is no new thing, but we hope an increasing knowledge of their value will create a brisk demand at home.—Long Island embraces 925,000 acres, of which 687,695 are yet unimproved.

ON THRASHING MACHINES.

To the Editor of the Farmers' Register.

It being my wish to procure before the next year's harvest a portable wheat machine, I seek information through the Register for directions where to obtain the cheapest and the best. I consider that machine the best, which will thrash the most wheat in the cleanest manner—which is least liable to break, and which requires no more than the ordinary skill and care which we can command in our overseers and negroes—and which is easy of transportation and fixture.

I have a stationary machine—a wooden one upon the plan, I believe, of the Scotch machines—with which I finished thrashing a fortnight ago, the fourth crop. It was erected for me in 1831, by John Clark, of Fredericksburg. It thrashed 1014 bushels in 1831, in 9 days, being an average of 112½ bushels each day—102 bushels the least, 147 bushels the greatest day's work: besides wheat of indifferent quality—not thrashed very clean.

In 1832, it thrashed on the 25th of June, 158½ bushels of early wheat, of superior quality; and in August, 1477 bushels in 12 days—say 11½ days, (having began late on the first day, thrashing 40 bushels only, and finishing early on the last day,

thrashing 50 bushels)—being an average of 128½ bushels—89 bushels the least day's work, 204 bushels the greatest day's work—866 bushels being of tolerably good bearded—and 611 bushels of very fine purple straw wheat, which yielded 11 for 1—leaving little or no grain in the straw. The machine averaged 108 bushels of the bearded, and 153 of the purple straw wheat, proving incontestably the superiority of the one over the other for machines, and showing the necessity of indicating the kind of wheat when we refer to the work of wheat machines.

In 1833, it thrashed 1952 bushels in 14 days—say 12½ days, (1 day being lost by breaking of the machine, and finishing early on the last day, having thrashed only 49 bushels)—being an average of 156 bushels daily—98 bushels being the first and least day's work (except the day it broke, which was 80 bushels) and 172 the greatest day's work—162 bushels being of early wheat, 440 bushels of bearded, and 1350 of purple straw wheat—the product small and of indifferent quality—the quantity of straw very large.

In 1834, it thrashed 2300 bushels in 17 days—say 15½ days, (1½ being lost by the breaking of the machine—being an average of 148½ bushels per day—114 bushels being the first and least day's work (except the two days it broke when it thrashed only 34 and 68 bushels,) and 185 bushels the greatest day's work—700 being of early wheat much mixed with purple straw—63½ bushels golden chaff wheat from four sown—and the balance purple straw wheat—all of good quality.

My machine cost \$170, exclusive of the shafts and main beam, and was put up by my own carpenters under the direction of Mr. Clark. It has cost me no more in three years, than a little hoop iron to line the bars of the concave. I think the machine a good one; but there are two objections to it—first, it is not portable—and secondly, the bars of the concave are liable to be broken by any hard substance which the wheat may carry in with it; but this objection might, I think, be removed by supporting the concave with strong springs which would yield to any thing less pliant than wheat straw. The draught is not too great.

There are various portable machines in use in this county. The best which I have seen, is a machine made by Wright of Frederick. It is, however, too costly, too heavy, and the draught is too great for our light mules. The same gentleman who owns "Wright's machine," has a machine made by Cockrane of Hanover, which I am disposed to prefer to all others, from the description given me; and I should be glad to see a detailed account of such machines. There are two machines made in Fredericksburg—the only difference, I believe, between them is, that the beaters and concaves of Davis's are cast—those of Ames's (Bayliss) are of wrought iron—both work with a band—the horse-power is nearly similar in both, and seems to me to be excellent—they do good work—but their durability has not yet been tested.

I hope that some of your correspondents will be induced to communicate to you the results of their experience in wheat machines. I have, perhaps, been unnecessarily minute in the account of mine.

E. T. T.

King George County, 5th Sept., 1834.

P. S. The wheat was measured after being fanned once, and the bushels heaped.

CALCAREOUS DEPOSITES ON PIANKITANK RIVER.

To the Editor of the Farmers' Register.

Upon the south side of Piankittank River in the upper part of Mathews County, upon my little farm, I have discovered oyster shells (or what we call marl) located in the bank of the river, which is very high, say fifty or sixty feet nearly perpendicular, and extends along the river on my land about half a mile long; the river at this place is tolerably salt and abounds with good fish and oysters. Intermixed with these shells, is a large quantity of a bluish or dark green colored mud or earth, arranged in the following order, a layer of shells running parallel with the bank about three or four feet through, while the mud takes its course in the same parallel direction, immediately below them, and claims possession of the very bottom of the bank, or surface of the river. This mud is the most unaccountable thing with me, for I know not what name properly to give to it, nor as yet can I estimate its value. Having moved here very recently, I have made no trial of it, but have a high opinion of it as a manure; and I am confirmed in this, from the fact of its having been partially tried this spring upon clover, by my friend and neighbor Mr. Jones. He applied the blue earth to parts of a clover lot, and marl to other portions of the same lot and at the same time, by way of ascertaining the different effects it might have, if any, and decides greatly in favor of the mud. He has also applied it to his field lands in small portions, and there the good effects are clearly seen. If I were to enter into a full description of this earth, I should not be able to give a perfect one. I would, however, here remark, that when taken from the bank and exposed to the air and it becomes dry, a white powder appears upon the lump; (indeed this sometimes appears upon the river shore where these deposits are found in very dry weather:) in breaking the lumps apart I discover numerous particles of transparent substances dispersed about the whole lump, which will dazzle the eye as it were in the hot sun. It approaches nearer what is called crystalized gypsum as it is described, than any thing else I know of. My friend Mr. Jones has a plenty of it, and we intend sending specimens to William and Mary for analysis, as I discover in No. 3, Vol. II, it will be gladly received there, and attended to by Mr. Rogers, who promises to give the relative value of all specimens submitted to his care. I think it necessary only to send specimens of the mud, as we know the shells above it are manure, and very fine, for they are nearly entirely decomposed, and apparently by some hidden mineral in the bank, for both shells and gypsum, if I may so call it, are over-spread with a sort of iron rust which is constantly oozing out of the bank. Nevertheless, as clear, cool and as well tasted water as I wish to use, proceeds from the bank both above and below these deposits.

If from the very imperfect and lame description, I must confess, which I have attempted here to give of these deposits, you or your many correspondents can give any hints of the probable benefits of it, it will be gladly received.

A. BILLUPS.

Mathews County, Sept. 12, 1834.

DIRECTIONS FOR MAKING OX-CARTS, AND FOR USING THEM.

For the Farmers' Register.

Essex County, September 20th, 1834.

The tongue of an ox-cart should be about fifteen feet in length, split as usual, and let into the cart axle by mortice and tenon, and confined by three-quarter inch iron pins. The axle should be rather more than seven feet in length, (I cannot say exactly, as some hubs are rather longer than others) and about six inches by four and a half, of seasoned timber, or it will spring and the friction will be very great. Saw up a hickory large enough for several. Lay off the shoulders four feet apart, neither more nor less, as this is the usual length, and if more or less, the labor of the oxen will be greatly increased, as one wheel will run in the rut that other carriages have made, and the other wheel over the uneven surface along side of the other rut. Draw a line down the middle of the broad side, (the side intended for the tongue to be up) which will leave three inches on each side of the line: lay off the diameter of the in-box from the bottom, leaving all at the shoulder to be taken off at top. The difference in the diameter of the in and out-box divide into two equal parts, and lay off one part from the bottom of the axle at the end of the length of the hub: then lay off from that the diameter of the out-box. Now the diameter of both boxes is laid off, draw a line from one to the other, and hew off bottom and top. The reason for dividing in half the difference between the size of the big and little box, and taking all off under the axle at the little box and none at the big one, is to bring the wheel perfectly plumb. After finishing the broad side of the axle turn the narrow side up, (the one that is intended for the top) and draw a line down the middle, which will leave two and a quarter inches on each side: then take the diameter of the in-box, and divide it into two equal parts; one part lay off back of the line at the shoulder, the other on the other side of the line; then lay off the length of the hub from the shoulder near which will come the linch pin, take the diameter of the out-box, and divide it into three equal parts; one part lay off back of the line at the end of the length of the hub, the other two parts lay off on the other side of the line. Now the diameter of both boxes is laid off, draw a line from one to the other, and round the squares. The reason for laying off at the little box one part behind and two before, is to make the wheel, in running, gently press to the shoulder of the axle. Were it equally divided into two parts, the wheel would be as apt to run off as on, and the consequence would be, should it pass off, there would be an open space between the hub of the wheel and the axle, into which the wheel would throw mud and dirt, which would at once sweep out the grease, and the constant and regular supply of grit would wear out boxes and axle. But what would be worse than all, it would so much increase the labor of the oxen. Inattention to making cart axles probably costs Virginia 1000 oxen annually. At best they are badly provided for, and the additional labor which this imposes upon them, they are very unable to bear, and as they become reduced in strength, the lash is applied to supply the place of strength, and thus the poor animals are murdered. An axle made in the way here recom-

mended, requires no additional labor to overcome unnecessary friction.

The body should be made of seasoned timber to prevent it from being shaken to pieces; the sills should be three and a half by three inches, the length nine feet, and twenty inches deep in the clear; the width should be four inches greater behind than before, to facilitate the discharge of the load; and to prevent the sides from being broken by a sudden turn of the oxen, the sides should be confined by four iron rods half an inch in diameter, made with heads, taps and screws, and placed at the sides near each end—a set will last one's life. The greatest breadth of the body at the axle cannot exceed four feet, unless elevated above the hubs, which should not be the case, for the load will be constantly pressing forward and give too much weight before; if to obviate this, a piece should be put across the tongue, or nailed to the sill of the cart where it rests upon the tongue, the body is raised and of course more inconvenient to load—the centre of gravity is also raised. From experience, I think by far the better way is, to hang it with strong hooks and eyes, not in the way they are generally hung, for they have too much play, and throw the body in contact with the hubs, but to make the eyes of three-quarter inch iron, allowing as little play as possible. The shanks to those that go into the axle, should not be more than six inches long; when over long the body is inconvenient to put on and take off. Taper them a little just at the point to make them slip more easy into the axle, sink the eyes a little into the axle and let them stand up straight, not bent down. The shanks to those that go through the sills of the cart should be three-quarters of an inch square, and confined by screw and tap. Sink the eyes a little into the sills. They should be put one foot nearer the hind part of the body than the fore part, and no more, or it will give too much weight before. That mode of loading, as if the necks of oxen were stronger than the cart wheels, is a very mistaken notion: it is death to oxen. In many countries they have carriages so constructed as to give no weight. A cart-man requesting assistance to enable him to discharge his load by throwing up the body, is a proof that something is wrong and should be at once examined into. Are the hooks and eyes too far behind? Has he passed over uneven ground that has caused the load to press too much forward? Or has he loaded improperly?

The yoke should be, for common sized oxen, from four to four and a half feet in length, the holes for the bows one and a half inches in diameter, and about five inches apart, more or less, to suit the size of the oxen, and so bored as to be rather nearer at top than at bottom. The yoke should be rather round than flat between the bows, to prevent galling. The chain of the foremost oxen should not be hitched to the staple in the yoke of the tongue oxen, but to a clevice attached to the end of the tongue of the cart, which should not be nailed to the top and bottom, but to the sides: and the wooden pin under the tongue which is used to prevent the cart from running on the oxen, should be sufficiently long not to let the end of the tongue touch the ground, which will prevent the clevice from being broken loose by the dropping down of the tongue. When fixed in this way they pull much more, but cannot in any

way pull much, compared to the tongue oxen. Some farmers drive three yoke to one cart, but there is nothing gained by it. A load of grain with us for one yoke of oxen is twenty bushels, for two yoke thirty bushels; so the foremost yoke of oxen are allowed to draw only half as much as the tongue oxen; the third yoke of course would draw only in proportion without allowing any thing for the weight of the cart. They do well in hot and dry weather to walk before and kick up the dust, to suffocate those that are laboring behind, and in the winter to pick their way and jerk those behind to the right and left that are doing all the work. One yoke well kept will do more work than three poor ones, because they pull to a much greater advantage.

A marl cart body, for four oxen, should be made of light materials, and should be about six feet long, four feet two inches wide behind, three feet ten inches wide before, all outside measure, and one foot deep in the clear, and without a tail-board. Then when loaded it will hold about fifteen bushels. The hooks and eyes should be three inches nearer behind than before. For further fixtures respecting this body, see a piece written by me, and published in Vol. I, page 197, of the Farmers' Register.

EDMUND F. NOEL.

EMMONS' CHAIN-BAND HORSE-POWER.

To the Editor of the Farmers' Register.

Richmond, Va., Aug. 7, 1834.

I have noticed in your Register of May last, an inquiry respecting Emmons' chain band horse-power, advertised on the cover of a previous number of your Register, by (the proprietors of the patent right for Virginia) Messrs. Jabez Parker & H. M. Smith of this city, and expressing a desire to see a more detailed account of it from some practical mechanic—of its applicability to a horse mill, its cost, &c., as also an account of the machinery made at Mr. Jabez Parker's agricultural machine shop. And considering myself a practical mechanic, having served as an apprentice to, and followed the machine making business for the last twenty-eight years; and having travelled through, and resided in the Northern and Western States, and seen and witnessed the operation of the most of the horse-powers and other machinery now in use; and having boarded for about four months past opposite to Mr. Parker's shop, which I have very frequently visited, and noticed particularly the before mentioned horse-power, (which he occasionally uses in giving motion to a grist mill, thrashing machine and circular saw,) as well as the other kinds of machines made and sold at his shop; I therefore consider myself a competent judge of them, and in the way of duty, as called upon to answer the inquiry in your Register before mentioned, and as a friend to improvement, and to the agricultural community, I with pleasure undertake to do so.

I have not time to give a lengthy detailed account of the chain-band horse-power, nor do I think it necessary; but this much I will say, that the one Mr. Parker has in use works very well; it is the most simple in its construction; requires less horse power to do the same work; is apparently more durable, and less liable to get out of order, than

any other kind of horse power that I have ever seen. It performs the same work with less horse-power or with more ease to the horses, than others, because there is little or no friction, there being no gear wheels—the motion being obtained from the chain-band winding from the whirl in the band wheel shaft into the forked ends of the levers from which the horses draw, so that the whole strength laid out by the horses, is immediately applied to turning the band wheel, without the usual loss there is in geared horse-powers by friction. This horse-power must, I think, be durable, as there is but very little wear upon any part of it, except the chain, and that, if it is kept out of the dirt and oiled, will wear a long time; and it being the same kind of chain in common use upon plantations, it is very easily mended or made anew by common blacksmiths.

Those horse-powers are light and portable, not weighing, I presume, over 800 to 1000 pounds, but may be made stationary for the same cost of portable ones, and their being but little cast iron about them, they may be easily made in any part of the country. They are well adapted to giving motion to a small grist mill, thrashing machine, cotton gin, and for all other purposes for which horse-powers are used. Mr. Parker's price for them, including a good leather band and all necessary fixtures, is \$100; but, I presume, they may be built for much less, where timber and labor are low.

JOEL BARNES,
Of Cincinnati, Ohio.

SKINLESS OAT, AND NUT BEARING PINE.

To the Editor of the Farmers' Register.

Hickory Grove, Northampton County, }
N. C. 1st October, 1834.

In a visit to the Virginia springs during the past summer, I formed an acquaintance with a very worthy gentleman (Mr. Arthur G. Rose) from Charleston, S. C., in whom I discovered a congeniality of taste with myself in experimenting upon the rare productions of nature. In our conversations on the subject, I learnt that he had procured some of the "skinless oats," and the "nut-bearing pine," and he was kind enough to promise me some of the seeds of both. On my return home, a short time since, I was highly gratified to find that they had safely arrived through my commission merchants in Norfolk, to whose care I requested Mr. Rose to consign them. I designed sending you a few of them, but finding in the August number of the Farmers' Register that a correspondent had sent you some of the oats, I shall herein send you six of the pine nuts, only. The nuts grow in a bur resembling a large unripe bur of our common pine, (except the color, which is the same as that of a perfectly ripe bur)—that is, the scales between which the nuts are enveloped adhere closely together. From the hardness of the nut I should infer, that it will take a considerable time to vegetate. I design planting some forthwith, both in the open ground and in a box, and also in the same way, early in the spring. Mr. Rose informs me by letter, that he has two flourishing young trees from the seed, but does not say when the seed were planted, or in what manner, or whether the bur sent me grew on one of

his trees. He says the seed were brought from Algiers. I recollect seeing some account of the nut-bearing pine, (perhaps in the "American Farmer") sent to this country by Commodore Porter from Constantinople, but whether any attempt was made to propagate it, and with what success, I have not learnt.

In speaking of the skinless oat at the springs, after Mr. Rose left, some gentleman put into my hands "Atkinson's Saturday Evening Post for the country," in which was a history of that grain; which stated that it was brought from "Chang-tang," I think, an interior province in China, to Amsterdam, and from thence to England. But the oat I have received from Mr. Rose, does not come up to the description of it given in that paper.

Whilst writing on the subject of oats, I beg leave to inquire, whether there are on James River, either above or below Richmond, a kind of oat called the winter or spring oat. A gentleman from Baltimore, who has an extensive acquaintance in Virginia, informed me that there was such an oat grown on James River or some of its waters. If I understood him correctly, I inferred that the oats were sown in the fall of the year, and were fit to cut in the spring, or at least much earlier than the common oat. I have a kind of oat known here, indifferently, by the names of the ruffled and feather oats. I think they are preferable to the common oat, but about ten days later. I divide my crop about equally between them and the common oat, which I think is an advantage. I saw but few of them growing in Virginia, and from the limited quantity, I inferred that they were either not generally known, or were considered to be inferior to the common oat.

The crops of cotton in this section of the country, wear a gloomy aspect, owing to an unprecedented drought, which caused the cotton plant to shed its forms or squares, blooms and incipient bolls, in a great degree, after the last working; succeeded by series of wet and warm weather, which produced the rot to an alarming extent, and which continues up to this time; and, I think, I am warranted in saying, that there will not be half the quantity made in this quarter, as last year. The same may be said of the corn crops, with the exception of the high fertile lands, and the alluvial bottoms of the Roanoke—the latter being subject to freshets, we feel alarm in consequence of the continued rains.

W. B. LOCKHART.

P. S. I have concluded to enclose a few of the skinless oats, for the purpose of comparing with those you have.

I find that the Chinese province of Chang-tang, or Chang-tong, is described as being a fertile region, but subject to long droughts. It lies in about the same latitude as part of North Carolina, and the adjoining, and other parts of Virginia; perhaps in the same as the whole of North Carolina and Virginia—the capital, Toi-nan-fou, being in latitude $36^{\circ} 30'$, north longitude $117^{\circ} 25'$, east.

CULTURE OF THE VINE, AND WINE-MAKING NEAR RICHMOND.

From the Richmond Enquirer.

We are happy to see the attention, which has been paid to the culture of the grape in the vicini-

ty of Richmond. We have already noticed the exertions of Mr. John Carter—the various grapes which he has cultivated, and the wines he has made.

We have also been much gratified lately by a visit to Mr. William Anderson's vineyard. It is enriched by a variety of vines—foreign and domestic. The Catawba, the Isabella, and the Schuylkill particularly, flourish in great perfection—and the vines are this season loaded with the most delicious fruit. He will probably make three or four pipes of wine.

We have been happy to visit the vineyard of Dr. Norton, and to taste his wines. Among the various specimens of the vine, to which he has directed his attention, we saw the Catawba, the Isabella, the N. Carolina Scuppernong, but especially "the Norton's Virginia Seedling," which seems to us to possess some very fine qualities.—We understand it has been produced by his impregnating the Bland grape flower with the pollen of the genuine Burgundy grape. The new fruit has the advantage of uniting the abundant saccharine character of the Burgundy with the never-failing productiveness of the Bland. The vine is a great bearer; and when the fruit is pressed, it produces a rich, luscious wine, which resembles the Burgundy Madeira. The Doctor was also kind enough to show us his wines that had been extracted from the Catawba and the Isabella—both of which are very agreeable. But, as the three varieties are the produce of the last vintage, they of course want the benefit of age to impart to them all their excellence. These wines are the pure juice of the grape, unadulterated with any foreign spirit. The fermentation which they have passed through, has produced alcohol enough to preserve them in their strength and purity.

The Doctor has also in his vineyard, a fine reddish grape, a native of Prince Edward, which he has brought into notice. It promises to do well.

The experiment of Dr. Norton, of impregnating one grape with the pollen of another, and of raising a new vine from the seed, and then engrafting the slips on the wild vine, opens a field of discovery to the vine-dresser, to which no perceptible bounds can be assigned. It may lead to some of the finest varieties, both for the use of the table, and for the making of wine.

We confess we were sceptics before, about the art of making good Virginia wine. We are no longer; and we congratulate our enterprising neighbors on the results which their experiments are calculated to produce.

INSECTS AND THEIR DESTROYERS.

Prince Edward, July 9th, 1834.

To the Editor of the Farmers' Register.

Worms, bugs, and other insects, do incalculable injury to the whole circle of vegetation. Scarcely a tree or plant is exempt from their ravages. Like time they hold their destructive course almost unseen, or but little observed, except in cases of general prevalence of some particular species, that carry manifest destruction wheresoever they appear. Yet it must be certain, that such infinite numbers as occupy almost every foot of the earth, must consume and injure a very large portion of its vegetable productions. Every means that can be devised to lessen their numbers, or to pre-

vent their increase, should be adopted. The increase of every innoxious animal that preys upon insects, &c., should be promoted. Birds are generally their enemies, many species of birds are very little injurious to vegetable production, and others not at all so, as bats, both leather-wing and feathered, the whole marten and swallow tribes, which prey alone on insects, and do no harm to any thing valuable to man, except the bee-eater—and these should be made the special objects of protection by the agriculturist. If you think likewise, can you not call the attention of your readers forcibly to this subject, and implore the clemency and protection of the community for the whole race of birds and other animals, which do either little or no harm to any useful production of the earth? Could not our high-minded generous Southern brethren particularly, be induced by a hint from you, to abstain from killing and eating the innocent martens that do nothing but good? And could not our own people be induced to spare the lives of the harmless highland frogs and lizards, &c. &c.

CHARLES WOODSON.

TO GIVE TO NEW CHEESE THE FLAVOR OF OLD.

From the Agricultural Journal.

If it be required to communicate to a new cheese the flavor and appearance of an old one, it may be done by the insertion in the new cheese of portions of the old one containing blue mould. The little scoop which is used in taking samples of cheese is a ready made means of performing the operation, by interchanging ten or a dozen of the rolls which it extracts, and placing them so as to disseminate the germ of the blue mould all over the cheese. A new Stilton cheese treated in this way, and well covered up from the air for a few weeks, becomes thoroughly impregnated with the mould, and generally with a flavor hardly to be distinguished from the old one. I have sometimes treated half a Lancashire cheese in this way, and have left the other half in its natural state, and have been much amused with the remarks of my friends on the striking superiority of the English over the Scotch one,

MANGE IN HOGS.

From the Southern Planter.

McDonough, Ga. 19th May, 1834.

Mr. Editor—During my travels through the state, especially in towns and villages, I see a vast number of swine dying with what is called the mange, while many others are upon the eve of expiring. This disease is very easily cured if persons would only take the trouble of pulverizing sulphur, and I give to each hog affected one table spoonful in a little corn meal dough twice a week for two weeks; they will shed the scurf and become perfectly clean and fatten. The sulphur at the same time destroys lice and fleas on the swine.

S. M.

TEASELS.

From the New Hampshire Gazette.

There has been a great rise in the price of the teasel or fuller's thistle, and some farmers in Hatfield and Williamsburgh have lately received large

sums of money for the produce of small quantities of land. Three or four years since, teasels were sold at 75 cents per thousand, and some as low as 67 cents; now the manufacturers give from \$2 37 to 2 50 per thousand. Two farmers in Williamsburgh have recently sold teasels to the amount of 1500 dollars. In Hatfield, a single acre has in some instances yielded 100,000 teasels, which have brought over 237 dollars. There are very few acres, however, that do this. Two years are necessary to bring a teasel crop to maturity; the plants require much care and labor, and are liable to be winter-killed and to other injuries. After the price fell to 67 or 75 cents, the cultivation was relinquished by many, and the present high prices are owing to a great diminution in the quantity raised.

RAINY DAY REFLECTIONS OF A PRINCE EDWARD FARMER.

To the Editor of the Farmers' Register.

After the drought which has been severely felt in our county for some time past, the morning has set in with a gentle and refreshing rain—refreshing to the tobacco crop; but the largest portion of the corn has passed the period when the beneficial effects of rain would have been felt. As I will probably be within doors most of the day, I know not how to spend my time more pleasantly than by making some remarks on farming: not that I have the vanity to think that any thing which may drop from my feeble and inexperienced pen will greatly promote the agriculture of our country, but that if possible I may be able to prevent the formation of gullies, and promote the filling up of those already formed.

The present degenerate state of agriculture in Middle Virginia, seems to be owing principally to two causes, viz: grazing and injudicious ploughing. What is known as the "three shift system," is the one almost universal in this country. While some have adopted a better system, yet as a general observation it is true, that our farmers have no standing pastures for their cattle. While in other parts of the State which have adopted a system of improvement on their lands, the luxuriant and fertilizing clover is seen to carpet every field at rest, ours are trampled and grazed to barrenness by little half starved cattle and sheep, which can hardly by unceasing industry through a long summer's day, get enough hen-nest grass and broom-straw to keep them alive. After harvest all the sheep, hogs, cows, and horses, are driven to the stubble-field, to devour the scanty provision made by nature to improve the soil. I have no doubt that land would improve if suffered to rest every third year, (land which has not been entirely killed by injudicious management) simply by an effort of nature to that effect; but this kind of management would produce barrenness in the most fertile lands I have ever seen, much more on soils naturally thin, sandy, and subject to wash. I have doubts whether or not this part of Virginia can ever be profitably employed as a grazing country, under the best system that can be applied. Be this as it may, we have convincing evidence arising from the diminution of our products, and the numerous galls and gullies on almost every farm, that it will not do at the present day. Arguments have been used in favor of large stocks

of cattle; but all reasoning, however plausible it may seem at first view, must be rejected as fallacious and unsound, which leads to results diametrically opposite to those desired by every judicious farmer. The manure of a drove of cattle is a small consideration when placed as an offset against the evils of grazing; for after all he has only a part of the herbage transferred from one part of the farm to the other. The same reasoning will apply to winter as well as summer. The requisite quantity of provender for keeping a stock of cattle as they should be, would amount to more manure, if spread on the land, than if eaten and trod during the winter. If this reasoning be just, and if we will keep more cattle than our interest dictates, for one I must look on the distemper which has taken off such numbers of cattle in the south, not as it is generally viewed, but as a remedy for one of the sorest evils which has befallen our agriculture. When the distemper comes and takes half of our cows, (and it generally takes a larger proportion) more ample provision can be made for those that are left, and less injury will be inflicted by grazing, while at the same time the profits in butter, milk, &c. will be more ample from the few, than from the many.

With these unconnected reflections, I leave this part of the subject, and pass on to one of equal importance—that of ploughing. I lay it down as a maxim, the truth of which will not be questioned by any one who makes just pretensions to skill in any business, that whatever is worth doing at all, is worth doing well. If this be the case in other matters, it must apply with increased weight when brought to bear on the subject of farming—an occupation which gives prosperity and support to all others—the main-spring of all trades and professions. Judging from the manner in which most of our operations on the farm are performed, we conclude that this rule is not respected as it should be, even by those who acknowledge its correctness. Of this class (and a numerous one I am pained to say it is) are those who plough up and down hill. Reason with people on the impropriety of such a practice, and they will tell you they hav'nt time to turn at short rows—that theirs is the "good old way"—as if their lands would not wash, and as if a gully formed in the day, it would close up in the succeeding night. After all that has been written on the advantages of horizontal ploughing, all that has been seen of its good effects in improving the lands, and after years of experience of evils on the opposite side they will still persist. This is what I call *Thomsonianism* (in other words quackery) in farming; and the effects of the one on the soil will work its own cure eventually, though as certainly as the other has burned and steamed itself to death in many infatuated communities of our country. Thousands of acres of land are now to be seen, once valuable and highly productive, now not worth the taxes. I think we should profit by the experience of such farmers, and that the day has come when we should have a better reason for doing things as some of us do than the one which actuated the young Dutchman when he preferred the old road up to the axletree at every step with stiff mud—"my fader did drive dis way, and I drive dis way too."

In old Prince Edward many are disposed to think this the garden spot of creation in a moral

and intellectual point of view. As to the truth of this remark I shall not undertake to speak; this must be done by some one better qualified to do it with impartiality than the writer;—but will those who value those things as they should, together with a healthy climate and good market, go on with a system which has inflicted so heavy a curse on this part of Virginia, and if not forsaken will eventually render the rest a "howling wilderness?" If we should stop even at this late day and adopt a system of unyielding improvement, our country which in many places has grown gray in youth, might again, by plaster and clover, be made to smile in all the beauty and freshness of the "Old Dominion." Then we should feel strong inducements to stay in Virginia, much stronger than some feel to seek a home in the uncultivated wilds of the West. Should not every consideration induce us to do it? Our own private interests, those of our children and of our country, conspire in a loud and united call for thorough and instantaneous reform.

A. A. L.

Aug. 20. 1834.

COTTON—ITS INTRODUCTION, AND PROGRESS OF ITS CULTURE, IN THE UNITED STATES.

From the Southern Planter.

Gossypium or Cotton, a genus of the polyandria order, belonging to the monodelphia class of plants, and in the natural method ranking under the 37th order, Columnifera. The calyx is double, the exterior one tripartite, the capsule quadrilocular, the seeds wrapt in cotton wool. There are four species, all of them natives of warm climates—1st. Herbaceous or common herbaceous cotton, has an herbaceous smooth stalk, two feet high, branching upward, five lobed, smooth leaves, and yellow flowers from the end of the branches, succeeded by roundish capsules full of seeds and cotton.—2d. The Hirsutum or hairy American cotton, hath hairy stalks branching laterally two or three feet high, palmated three and five lobed hairy leaves, and yellow flowers succeeded by large oval pods furnished with seeds and cotton. 3d. The Barbadosense or Barbadoes shrubby cotton, hath a shrubby stalk branching four and five feet high, three lobed smooth leaves glandulous underneath, and yellow flowers succeeded by oval pods containing seeds and cotton. 4th. The Arboreum or tree cotton, hath an upright woody perennial stalk branching six or eight feet high, palmated four or five lobed, smooth leaves, and yellow flowers succeeded by large pods filled with seeds and cotton.—Encyclopedia Britannica, vol. 8, p. 21.

The above extract will more satisfactorily give the classification or order in which the cotton plant stands in the vegetable world than I could do, and I have the more readily adopted it, because it distinctly embraces all the cottons that are extensively cultivated in the United States, and little need be added except that the seeds of the first and second varieties, besides the cotton wool that covers them, have the seeds in whole in the second variety, and in part in the first, covered with a close short fur very analagous to the under fur of an animal; and in the United States all the cottons seem to have an increasing propensity to the production of the fur or down. It increases the diffi-

culty of separating the wool from the seed, but has no other injurious effect. Whether this change is in obedience to some slow, moving, but irresistible law of nature, applying as well to the vegetable as to the animal world, or arises from the intermingling of the farina of cottons of different varieties having in some districts been carelessly brought together, must be left to time and careful observation to determine.

The Sea Island Cotton of Georgia, and of course of Carolina, is derived from the fourth and last variety of cotton in the above classification. It would be perennial if the climate would permit it, and is so when the lands are new, and the soils warm and favorable. I have known it in new and warm alluvial soils to survive for five years; and have often seen it vindicate its claim to its character of arboreum or tree cotton, in the height to which it grew, for I have measured plants that were eighteen feet high, and that put on the character rather of trees than shrubs. But when the cotton grows so large it yields no return to the cultivator. The winter finds it still covered with blossoms or unripe fruit, and a single night of freezing weather, which may be expected by the first of November, blights at once, as well the fruit as the flowers and stems.

When this fourth variety of cotton was first introduced, this was the case, and I do not remember, (for I remember the time well,) that a single pod rewarded the attempts in giving promise to the future. But the winter of 1785 and 1786 were fortunately mild, the cotton under experiment had generally been planted in new, and warm, and fruitful soils—frost rarely penetrates far into the earth in such situations in Georgia. The roots of the cotton had been sheltered and protected by the earth from the cold, and that life which had slumbered in the roots of the plants during winter, was awakened into activity in the spring. The cotton stalks which had been killed in the winter were cut down to the surface of the ground. The shoots that grew up from the roots of the previous year were earlier in their growth, did not rise so high, sooner blossomed, and sooner bore fruit. The second year the cotton bore and ripened its fruit, the seed was in some degree acclimated, and the first steps taken which were to end in a few years in making the United States emphatically the cotton country. This great revolution in the commerce and manufactures of nations was effected by a few thousand people, scattered through the two Southern States of the American Union, not cheered on upon their labors by the bounties of one nation or the diminished duties of another; but rather living and laboring under the law of two great empires, who alternately sent increased duties and commercial restrictions, long embargoes, and war, and national tariffs, to oppress, and restrain, and control their labors—those labors which were to give to ten thousand ships their freight—to millions of men, women and children labor and the bread which it brought, and to millions more a cheaper covering than they ever wore.

But we will proceed to the objects of your inquiry and leave bad and blundering statesmen to the wrath of him, who visits the sins of the fathers upon the children to the third and fourth generation.

The provinces from Virginia to Georgia had been planted by the mother country for her own

purposes. The persons who had emigrated to these plantations had gone to them with the hope of repairing or improving their condition; neither laws or religion had driven them there. Their interests still united them, and these feelings bound them to their own, or to their fathers' ancient home. When therefore the war of the American Revolution overtook them, the abstractions which were to break to pieces a great nation, and which for the first time perhaps in modern ages, had originated with the rulers and not with the ruled. These abstractions divided the southern colonists as they had divided the people of England; and although none felt that it was right that the descendants of Anglo-Saxon men should be taxed without being represented in the Parliament that taxed them, yet many thought the distant evils that would result from this course was to be borne rather than the immediate evil of civil war and its many consequences. Friends were therefore alienated from each other, and families broken asunder in their tenderest relations—but when peace came and individuals found themselves scattered that were once near each other—earlier remembrances were recalled—messages and letters began to be interchanged, and the position in which the revolutionary war had severally left them became known to each other. England rather remembering the past than looking to the future, seemed to be desirous of placing faithful sentinels at the two extremes of the American Republic. She therefore from her many colonies, selected Nova Scotia and the Bahama islands as the only colonies where a provision in land was to be made for the loyal men who had clung to her fortune through blood and in ruin. These provinces offered no inducements to the agriculturist at the time, but Providence more kind than government, was about to produce a great change in human affairs. Ark-right had designed and perfected his spinning machine, between 1783 and 1785, and when the southern colonists were landed with their faithful slaves upon the rocks of the Bahama islands, in looking around for something upon which they might employ themselves, the new interest which cotton had awakened, in consequence of Ark-right's machinery, reached them. Probably the Board of Trade invited, and may have aided them upon this subject, but at least they obtained the best cotton seed that was any where to be found, to commence their labors with. There is a small island in the Caribbean sea called Anguilla, which had been long known to produce the best cotton of the West Indies. The new settlers in the Bahama islands procured cotton seed to commence the culture with from Anguilla. They had in the year 1785 introduced the culture of cotton upon several of the Bahama islands successfully, particularly upon Long Island and Exuma. The father of the writer of this paper, in the winter of 1785 received from Col. Kellsall, then a planter upon Exuma, a bag of cotton seed. Several other persons in Georgia received about the same time cotton seed from their old associates or friends. Wishing to be particular, the writer will state what he remembers: among the persons who did receive cotton seed was Josiah Tattnall of Savannah, from his father then Surveyor General of the Bahama islands. From the cotton seed transmitted that winter in small parcels from the Bahama islands, has grown up the sea island cotton of Georgia and

South Carolina. In the long and diligent cultivation of cotton for now almost forty years, many changes have been observed to have come over the cotton under the influence of soil and climate; but the writer can distinctly state that the cotton he now grows is descended in direct line from the cotton seed received by his father from Col. Kellsall, and that every plant of sea island cotton in either Georgia or Carolina, is derived from the small parcels of cotton seed transmitted about that time from the Bahama islands, and which was the seed known in the West Indies as the Anguilla cotton.

It was soon noticed by cotton growers that soil and situation had more than common influence, as well upon the quality as upon the quantity of cotton produced upon any given portion of land. Certain soils and situations retained in the cotton its original appearance, an intenseness of yellow in its blossom, a fruit full and sound, a seed quite black, and free from fur or down; while upon other soils and upon other situations the plant, the flower and fruit was putting on other appearances. The plants as if anxious to adjust themselves to a new temperature, took on a more coarse configuration of limbs and stem, a thicker branch, a rougher, larger and more scalloped leaf, a more cone like pod, a seed covered either in whole or at its points with the close down or fur that has already been described. At first the most careful cultivators were anxious by selection to keep the seed as much as possible resembling the seed first introduced; that is, black and free from down, and the more so as it was most easily separated from the cotton by the machines employed, and was considered most productive; but in process of time the varieties that stole up among the original stock was found to produce a finer and more uniform and longer wool. The current of selection has now therefore directed itself another way, and these hybrids, for I believe them to be so, although the germs of these changes may have lingered for ages in the original seed without developing themselves, have taken on three distinct appearances in seed; neither in blossom or plant differing to the eye from each other, although greatly differing from the parent stock, as being coarser and rougher in their form and leaf, with blossoms of a lighter yellow; having bolls larger and more cone like in their shape. The finer cottons of the sea islands are obtained from these three varieties of seed: one with little or no down upon it, but with a long beak or point, to a seed longer than the original; a seed with down upon the two ends, but still with the pointed beak; and thirdly, a long seed with a sharp beak but completely covered with a soft close fine fur or down inseparably connected with the shell of the seed. These new varieties which produce the cotton now most in request are later in perfecting their fruit, and have consequently increased the uncertainty of the most uncertain and doubtful crop to which perhaps human care was ever directed.

But we will now proceed to describe the situation and soils. There is a long string of islands extending from Georgetown in South Carolina to St. Marys in Georgia, that is, from 32° 30' to 30° north, a distance of about 200 miles. These islands were covered with live oak and other evergreens of a southern climate. They had been the abode of the red men of the West, but rather

when the natives were fishermen than hunters; and the vast accumulation of oyster, and clam, and other shells, mingled with the remains of the bones and pottery of their old inhabitants, fill every stranger with astonishment at the multitudes which their remains would bespeak, or the long time that must have been required to introduce such accumulated masses. These decaying shells seem to have intermingled with the original sandy soils of these islands, and digesting the vegetable matter that fell from trees and other sources, formed with them a light and fertile loam. These islands at an earlier period of colonial story, had been employed in growing indigo. It was upon two of these islands, surrounded by the salt waters of the sea, and separated from the continent by several miles of grassy but salt meadows, that the cultivation of the sea island cotton commenced.

If Frederick the Great, never forgot him that introduced a better description of rye into Prussia, and if Swift is right in saying he merits a great name who will make two blades of grass grow where one had grown before, why should we deny to the dead what may be their due? The first cultivators of the sea island cotton in Georgia, were Josiah Tattnall, and Nicholas Turnbull, on Skidaway island near Savannah; James Spalding and Alexander Bisset, upon St. Simon's island at the mouth of the Altamaha; and Richard Leake upon Jekyl island adjacent to St. Simons.—For many years after the introduction of the Anguilla cotton, it was confined to the warm highland of these islands, bathed by the saline atmosphere, and surrounded by the salt water of the sea. Gradually, however, the cotton culture was extended into lower grounds, and beyond the limits of the islands to the adjacent shores of the continent—into soils containing a mixture of clay, and lastly into coarse clays, deposited by the great rivers where they met the tides of the sea. In all these soils the cotton plant grows well. In all these soils fine cottons are produced. The only essential property that is required, is a saline atmosphere; with it any soil in Georgia or Carolina may produce fine cotton—without it no soil will produce fine cotton.

It is within this district of country, from Georgetown in South Carolina to St. Marys in Georgia, and extending not more than fifteen miles from the sea, to which the sea island cotton is still confined. Whenever it has been carried either south, or north, or west beyond these limits, a certain decline in quality has followed its removal. Many changes have taken place in the manner of cultivating the sea island cotton since the first introduction. When first introduced, the seed was deposited either in hills raised a little above the common surface at five feet distant each way, or in holes at the same distance apart, and the intermediate spaces were dug up, pulverized and kept free of grass or weeds by the hand hoe or by ploughing. But it was soon found that this distant planting, with a few seeds only, left a great portion of the field unoccupied by plants, and consequently unproductive; for as it has already been said, the cotton plant is one of the tenderest productions of vegetable life. The growers of cotton found it therefore necessary to increase the quantity of seed, to insure a sufficient number of plants, and to bring them nearer together. Fortunately for the cotton culture, Tull's book upon husbandry had been

more read in the southern colonies than in England; and his ridge husbandry was adopted for sea island cotton, and is particularly adapted to it, I may say necessary to its successful culture.

The present process, (and it has been the same for twenty-five years past,) is to make up the field into ridges occupying five feet of space each, and extending in straight lines across the entire field. If the land is at all low or subject in any degree to water, these ridges are intersected at one hundred and five feet from each other by ditches which receive the water that may collect in the hollow spaces upon which the cotton plant is growing. These hollow spaces represent the water furrow in wheat cultivation, and serve the same purpose, that is, in directing the redundant water that falls, into the drains that take it off the fields.

A field is well prepared to receive the cotton seed when drains intersect it at regular distances of one hundred and five feet; when the surface of the land is thrown up into ridges of five feet, rising about ten inches above the intervals, the crown of the ridge flat, broad and regular. A trench is then made along the middle of the ridge from two to four inches, dependent upon the time of planting, which extends from the first of March to the first of May. Upon this subject as upon all others in which men are concerned, wisdom is found between the extremes; and experienced growers of cotton generally prefer planting from the first to the fifteenth of April. When cotton is planted early in March, before the sun has warmed the soil to any great depth, it is necessary to deposite the seed in drills not more than two inches deep, or there will not be warmth enough to vegetate the seed. Later in the season when the power of the sun has increased, it is necessary, in seeking for that moisture which is as requisite for vegetation as heat itself, to sink deeper into the soil, and the drills which are then made to receive the cotton seed are required to be four inches deep. From the many accidents to which this feeble plant is subject in its first growth, experience has taught the Georgia cultivator that it is necessary to place many more seeds in the ground than can grow there; and it is usual therefore to sow at least one bushel of cotton seed to the English acre. The persons employed in planting the cotton are generally divided into gangs of three. One of these opens the drill along the top of the ridge; the most intelligent of them carefully drops the seed into the trench, while the third follows in his, or more often in *her* steps, and with a hand hoe returns the soil while yet moist into the trench from whence it was taken. For myself, I prefer performing this operation with the foot; it is less troublesome to the laborer than carrying and using the hoe. It keeps the mind intent upon one operation rather than two. Walking along erect, the feet are alternately employed to return the soil into the trench upon the cotton seed; and the whole weight of the person brought to bear upon the foot that has just performed the operation, presses the yielding and crumbling soil into close compact with the seed. This pressure of the foot after sowing, is like the roller in English husbandry, and is as beneficial to cotton as the roller is known to be to wheat or other grain. But after all this care, you are never sure that from your first sowing a sufficient number of plants will stand. One night's frost, which sometimes comes as late as April,

will destroy the whole field, and drive you back upon your labors; one day of a strong, dry, north east wind will tear, blight, and destroy your whole field; and upon the best and richest soils, when both these evils are passed over, there is another ensuing, equally destructive. The cock chaffer or cut worm is to be apprehended during all the month of April, and as the cotton comes through the ground and remains for several days, like the pea or other pulse, with but two radical leaves, every one of the plants that are cut by the worm, either above or below the ground, are destroyed; so that it is not unfrequent that whole fields have to be replanted in the month of May; about which time the worms pass into their winged state. At the close of the month of May, when apprehension from these accidents have passed away, a new labor begins. The numerous plants which crowd the ground, begin to injure each other and must be removed. Prudent persons divide their removal into three operations, gradually adjusting the number to the increased growth of the plants, which are at length left in the drills, at from six inches to twenty-four inches apart from each other, depending upon the fertility of the soil and the expected growth of the plant, which rises in altitude, from three feet to eight feet high. And here it may be well to observe, that the cotton plant is a leguminous plant, (a green plant,) a plant that sends its roots down into the ground, and draws much of its nourishment, by its broad leaves, from the atmosphere. This increased distance in the drill, therefore, is rather to allow space for the plant to extend itself at its inclination, than from a desire to add nourishment to its roots, for at last the whole field should be shaded from the sun when the plants are fully grown, and the number should be adapted to that end.

But at every one of these *thinnings* as they are called, or drawing of the plants, the field is cleared with the hand hoe from all weeds and grass, and new soil brought up around the remaining plants to support them, now bending to every wind, from their tall but feeble structure. This course of thinning when it is necessary, and the weeding, and grassing, and drawing up, which is always necessary, continues, until about the 20th July, by which time the operation has been repeated from three to six several times, dependent upon the soil and season. About the 20th July we may expect our summer rains should commence. These rains are not tropical, but they approach to tropical in their violence. Up to that time no climate can be more temperate than the climate of the sea coasts of Georgia and Carolina. Volney, from report, supposed it the best in the United States, and the writer of this paper believes it is so. The atmosphere is elastic, the winds that blow every day from the sea are cool and refreshing; they bring health and healing upon their wings; they drive the vapors which have been gathered upon the waters, or that have arisen from the marshes which margin the shores, over the woods of the interior. But the time has now come when evil spirits should prevail. These vapors have been collecting dark and ponderous clouds upon our western hills; the equilibrium of our atmosphere is destroyed. Whether it is that the adjacent seas have become heated by the mass of warm water which the gulf stream brings along the coast, or that the same general cause which operates with

such great power within the tropics, operates in part here, I know not. But from the 20th July to the 1st August, the winds change from southeast to southwest and bring down clouds charged with lightning and rain, in such masses as to deluge our fields. From the time this change takes place all labor in the cotton field should cease; for the plants, with broad, succulent leaves, and tall and slender stem, heavy naturally, in its growth, and feeble in its structure, can ill bear up against beating rains and strong winds, and requires all the support that the original ridge in which it was planted, and the repeated dressings up which have been directed, can give it. And hence arises the necessity of the ridge husbandry of the sea island cotton, in Georgia and Carolina, and the importance of the repeated gathering or dressing up of the soil to the plants which has been described. The month of August is a month of doubt and anxiety with the cotton grower. Too much rain makes the plant cast off its fruit, its blossoms, and even its leaves. The full moon in the month of August too, is the time when the caterpillar is expected. This worm proceeds from a small brown butterfly, greatly resembling the candle moth. This moth or butterfly deposits its eggs upon the leaf of the cotton plant always a night or two before the full or change of the moon. They hatch in a few hours after they are deposited, then so small as scarcely to be visible to the naked eye. Like the silk worm, they appear to linger in their first stages, doing no great injury during their first nine or ten days. But a few days before they have completed their growth, they become voracious in the extreme, and like the visitations of the locusts in the east, destroy whole fields in a few days. We have seen four hundred acres of cotton that looked promising and well to day, and that four days afterwards had not a green leaf, and scarcely a small pod remaining upon it. These destructive visitations, judging from the past, may be expected once in about seven years. When cotton fields have escaped injury from rains, from wind, or worms, they offer as beautiful a spectacle to the observer, as the cultivation of any plant can present. One wide and waving field of green leaves, covered from the first day of July to the first day of September with blossoms of three colors, and with a multitude of pods of every growth. The blossom on the first day of its coming out is of a fine yellow color, and it sustains that color during the day. It changes under the influence of the night air to a crimson or red hue; and again on the third day it becomes of a rich chocolate brown, and falling to the ground leaves a pod already of half an inch in diameter. The time which intervenes from the blossoming to the perfection of the fruit, greatly varies, depending upon the season. We have marked hundreds of blossoms which ripened and perfected their cotton in twenty-one days from the day of blossoming; and again we have frequently seen them require six weeks to arrive at the same end; which is however a bad omen, as to ultimate results.

The cotton pods begin to open about the first of August. From this time to the first of December the whole attention of the cultivator is directed to the picking in of the cotton as the pods daily open. During this autumnal season in Georgia and Carolina upon the sea coast, the winds are violent and the rains heavy; so that the operation is tedious

although not laborious; and during this time the persons employed may be expected to gather from the field 25 pounds per day, when the weather admits of gathering or picking cotton as it is called. When every thing is favorable the persons employed should bring in 50 lbs. daily of cotton in the seed; but as the gathering is continued so long as they bring in 10 lbs. twenty-five may be considered the full average of labor so directed. There are few subjects upon which there is more contrariety of opinion than upon the real amount of product given by the soil in any cultivation; agriculturist as I am, loving my profession as I do, seeking information to enlighten my labors as I have done, I know no book upon which I can lay my hand which would give me correctly the real mean result of labor or of land employed upon any one object throughout a whole extended district. The Abbe Raynal kindly tells us how many coffee plants and how many cotton plants grew upon the French part of the Island of St. Domingo; and yet there was not one planter in St. Domingo who could really have told how many cotton plants or how many coffee plants grew upon any one arpent of his own field. Taking however the best means my long experience would give, I should say that a laborer cultivates, in sea island cotton, four English acres, and that these four acres yield as the result of his labor 500 weight of clean cotton, or cotton separated from the seed, which consists of 400 weight of white cotton and 100 weight of colored or stained cotton; and that these 500 pounds of clean cotton have for the last fifteen years averaged to the grower 20 cents per pound for his white cotton, and 10 cents per pound for his stained cotton, yielding in American money, consequently \$90 to the laborer—a small remuneration, certainly, to the cultivator, and not calculated to excite jealousy or hostility in any other persons engaged in any other pursuit.

The "*process of preparing sea island cotton for market.*"—The process in preparing the cotton for market commences as soon as it is generally gathered in from the field and is tedious and troublesome in a high degree—the cotton when gathered from the plant, is put into a bag, containing about a half bushel, which hangs upon the person engaged in the operation, suspended from the neck or waist as they may prefer, and when it is desired by them they deposit the contents of the bag in a large light basket, which contains the amount of each one's gathering in the day. At the approach of night, the cotton gathered in the day is brought home and weighed and deposited in a common house, from whence the next morning if the weather is good, it is carried out and spread upon drying floors, made of two inch American pine. These floors are of course proportioned to the quantity of cotton expected to be placed upon them at any one time, but may be estimated at twenty by forty feet of floor to every hundred acres of cotton cultivated; and in that ratio of quantities upon these floors. If it has been gathered from the fields in good weather, the cotton is allowed to remain but one day to take off the dew of the morning or the damp of the night air; but if gathered in wet weather, it may require two or even three days exposure upon the drying floors, which are raised upon posts three feet from the ground, as well to preserve the wood of which they are made, as to admit a more free circulation of air. It is how-

ever known that strong cold winds or very bright suns, if continued too long, have an injurious effect upon the fibre of the cotton; and this extreme exposure to either wind or rain is, therefore, carefully avoided, and the cotton left no longer upon the drying floors than is necessary to preserve it from heating in the house. Before it is put up finally in the house, it is usual and quite proper to pass it through what is called a "Whipper" to shake off any sand or broken leaves, or any other extraneous matter that may have attached itself to the cotton, either in the field or in the gathering. The cotton having been gathered, dried upon the floors, and whipped, is ready for the next operation, or ginning.

The whipper, which is a very necessary instrument in the well preparing of cotton, is made of wood, is a long barrel, composed of slats, or reeds, (or it might be better made of wire,) six or eight feet in length, and two feet in diameter, with one end closed and the other open, and is supported at the two ends by feet of different lengths, so that the barrel in its horizontal position declines about one foot at the lower end; a hopper containing about a bushel rests upon the upper side of the barrel, at the upper enclosed end of it. This hopper lets the cotton that is to be cleaned, fall into the barrel, through which runs in its whole length a shaft which is turned by the hand, by a crank attached to the shaft at the end. This shaft is intersected by rods, which reach to within an inch of the barrel. The cotton, as it falls from the hopper, is whirled round and round by these rods, until it escapes at the lower end of the barrel, by which time any sand or dirt, or leaves, or other matter, attached to the cotton has escaped through the spaces intentionally left between the slats or reeds, which constitute the external rim of this barrel or whipper. This whipping was formerly performed as well upon the cotton in the seed as after it was separated from the seed; but the second operation of the whipper has latterly been discontinued under a belief that it produced a stringy appearance in the cotton wool.

The whipping of cotton at its first gathering and while attached to the seed, is really beneficial and should never be omitted. When these operations are completed, the harvest may be considered as closed, and the preparation of the cotton for market really begins.—Many machines have been designed, and many forms of the same machine adopted, for separating the seed from the sea island cotton, but all of them at last resolve themselves into two wooden rollers turning by opposite movements upon each other. The rollers are from half an inch to an inch in diameter, and revolve from one hundred times to five hundred times in a minute. The whole resolving itself into this simple rule, that the smaller the rollers and the slower they revolve, the cleaner will be the cotton separated from the seed, because if the rollers are an inch in diameter, and above all if they revolve with a high velocity, they will take in soft seeds, small seeds, and false seeds or motes as they are called, and in crushing them in their passage through the rollers, will stain and injure the cotton in its appearance.

Much money has been spent upon costly machines, propelled by horses, by water or by wind, first in the Bahama Islands, and for many years in Georgia and Carolina, but at last most of the

growers of sea island cotton, have returned to their first and most simple machine, to wit, two wooden rollers kept together by a wooden frame, and a square shaft, upon which is fixed a wooden or iron fly wheel, from two to three feet in diameter. The iron cranks which turn the rollers are connected by strips of wood with a treadle worked by the foot, this treadle runs under the machine, and is connected at the farther end of the floor of the house, by sockets within which it revolves; the man stands therefore in the front of the rollers, with a board between him and the rollers, upon which he holds a large handful of seed cotton, which he presents from time to time to the rollers, that are kept in motion by the pressure of the foot upon the treadle,—this labor from habit becomes easy, as the feet is often changed in the operation. The task expected from the laborer with the machine, (which costs when new and complete ten American dollars,) is from twenty-five to thirty pounds per day. Women from their careful attention, in keeping the rollers while they revolve upon each other, well supplied with seed cotton, were unquestionably the best ginnerers, as they are called from the term gin applied to the machine, but in process of time it began to be believed, that the continued motion of the feet produced a relaxed system in women, which was likely to lead in the end to abortion, or miscarriage, men have consequently been substituted for this work, one which being within doors, and exercising both hands and feet without very much labor is preferred by them to any other in the winter. What is a little surprising, this simple machine, the foot gin, which we received from the West Indies, is mentioned if I mistake not, in the remains of "Nearchus's," voyage down the Hindus in Alexander's expedition, as gleaned and translated by Dr. Vincent, or Maj. Rennell in his map of Hindostan, as there employed for separating the seed from the wool which, the Greeks, for the first time, saw growing upon trees and shrubs. Could Asia Minor, could Greece and Egypt, have been acquainted with the cotton plant up to that time? The inquiry is a little curious, nor is it uninteresting, but can better far be made, by one who lives surrounded by much of the wreck of past knowledge, by many of the memorials of past time, than by him who is living, in solitude, under the shadow of his oaks, on the shores of the Altamaha. But we will return from our wanderings, to the subject of your inquiries. To prepare the cotton for this ginning, or separation from the seed; when taken from the house where it was put, from the field, it is carefully looked over and separated, or sorted, as it is called, the yellow cotton, the motes, any hard rotten, that may have passed through the whipper, is separated from the white; this is a work of care and attention and the future appearance of the cotton, much depends upon the manner in which this work is done. Women are employed in this operation, seated upon benches with tables before them; the seed cotton is spread in small parcels, taken out of one basket examined and turned over to another into which the person puts the entire of her day's labor. The quantity required to be thus examined and cleaned in the day by each one, is from sixty to one hundred pounds, according to the care bestowed upon the cotton, by the grower; after this sorting, it is exposed lightly and shortly to the sun, that it may take off any damp-

ness the cotton may have acquired in the house; it is then passed from this drying immediately to the gin, or machine that separates the seed from the wool; after going through the gin and being separated from the seed, it is again turned over to the women who are generally in a large room, well lighted with glass windows. They sit with small tables before them, made, either with open slats, reeds, or wire, when any crushed seeds, any burnt, or blackened by the machine, and mote that has escaped the former searches are removed; and to have this work well done, thirty pounds is all that is required per day from each woman. After this third operation it is considered ready to be bagged for market.

The bags in which sea island cotton is shipped are almost exclusively Scotch, are made of hemp, forty-two inches wide, in the web, and should weigh one and a half pounds to the yard; these bags each required from four and one-quarter to four and one-half yards, and then are made to receive three hundred pounds of cotton. Two men are generally employed at a time in packing, and usually pack two bags in a day, in the manner following. The room into which the cotton has finally passed, after being prepared for the bag, is reserved expressly for that purpose, and is kept as clean in floor and walls as possible; adjoining to it is a small apartment under the same cover with a round hole made in the floor, just large enough to contain the bag when full of cotton, the open end of the empty bag is strongly sewed with twine, round a strong hoop, which extending beyond the hole suspends the bag vertically from it; one of the men then gets into the bag, with a heavy wooden or iron pestle, he presses the cotton gradually with his feet, and finally beats it down with the pestle, until the requisite quantity is pressed down into the bag. The bags were formerly made wet before they began to fill them, under the belief that it kept the cotton down in the bag, when pressed there, better than when dry, but this is an idle and often an injurious practice and should be always avoided. We will now look back and collect the quantities of labor that is or should be applied to every bale of 300 lbs. of sea island cotton in preparing it for market. It requires 1000 lbs. of seed cotton to produce 300 lbs. of clean white cotton wool; 15 persons will be required to sort and prepare this 1000 lbs. for the gin or machine, taking all weather 25 lbs. is the mean quantity, received from each gin per day, this gives 12 days labor to each bag for ginning; and 10 women mote these 300 lbs. of cotton in the day, making for sorting 15, for ginning 12, for moting 10, for packing 1, in all 38. But besides these 38 that must be good and steady persons, there are usually two inferior persons, young or old to place the cotton which is about to be ginned upon the drying floor, or to remove and pass it about in any change of weather, thus requiring to every bag of sea island cotton well put up, the labor of 40 persons one day. The bag costs for bagging, for twine and trouble in making not less than 1 dollar and twenty-five cents, of American money—this, with 75 cents for freight is to be subtracted from the value of the cotton as there is never any return made for the bag by the purchaser.

The quantity of sea island cotton has not materially increased within these last ten years, nor is it likely that it will increase. The particular soils

and climate that have heretofore produced it and so while it probably owes its quality and confined to the limits first stated, that is from Georgetown in South Carolina to St. Marys in Georgia. By looking at a map of the United States it will be seen that the long string of islands that bound our southern shore and separate the Atlantic Ocean from the continent and at these points; but what is more, the tides that probably assisted to cast up these island, have changed their climate. The tides along the shores of North Carolina and Virginia, are much less than in Georgia, and they rise still less in Florida, and the Gulf of Mexico, that bounds the new acquired provinces of the American Union, to the south west.

Whether it is, that the cultivation of the sea island cotton, has afforded, fewer inducements than other subjects of cultivation; certain it is, the number of those engaged in it, even within these limited districts, have not greatly increased, and it is the successors, of the first cultivators, that are still engaged upon this object. They are generally an educated people, and a stationary one, less anxious after change than their countrymen are supposed to be, and although, severely smitten in war by England, and in peace by the National Tariff, they have still clung with some degree of fondness, to the places, whereat they were born, and to the seas, in which they were bred.

Short Staple Cotton.—The short staple cottons, of every part of the United States, are derived from the first and second varieties of cotton, were found in the United States, from Virginia to Georgia, at the close of the American Revolutionary War, cultivated in small quantities by the poorer classes of the white population of the country, to be mixed, in their domestic manufactories, with their own wool. The cotton for this purpose, was separated from the seed, by the old and the young, with the fingers, sitting around their evening fire, and was spun by the hand wheel, to serve as a warp, to be filled, with the wool of their own sheep.

These two descriptions of cotton, that is the common herbaceous cotton with smooth leaves No. 1 in the classification, and the 2d or hairy American cotton, were cultivated by very many for domestic purposes, but I have no where seen or heard of any attempt at producing either of these cottons for sale, before the introduction of the West India seed, and the increased attention this circumstance produced to the subject. Whether indigo and tobacco, the great staples of the southern provinces, were preferred to it, or whether, (which is probable,) the difficulty which was found in separating the seed from the wool by any other means than the hands, had checked cultivation, I know not, but probably both combined.—Three or four years since, the writer of this paper, having written a letter upon American cottons at the desire of a gentleman in England, ventured to suppose that these two varieties of cotton had been introduced into Virginia by some one or other of the early governors of that province while under the patronage of the crown. Subsequently to that time, in some of the long discussions within and without the halls of the American Congress, upon the American system of duties, it has been discovered that cotton had been introduced many years since into Virginia, from the Turkish dominions in Asia, probably from Smyrna; and the

cotton seed stole along with the Virginian colonization of the Southern States; for in truth, the Southern States of the American Confederacy are colonies of Virginia more or less directly derived, while the northwestern States of the American Confederacy are colonists more or less direct, from the New England States, with all of their industry and much of that economy which qualifies them the better for being farmers where little is risked and patient industry is sure of moderate reward, than in being planters or growers upon a large scale of products, which sometimes well reward enterprise, but too often disappoint the sanguine expectant, and send him homeless and houseless, in his age, to seek still farther south or farther west for cheaper and for fresher soils to labor upon. But wherever he roams, however unfortunate his condition, the cotton seed, like the maze seeds, is carried along with him. The one supplies him with bread, and the other supplies the material for his clothing, or affords him the means of buying it. It is this roving disposition of the southern American people, who carry their cotton seed to seek for newer and for fresher fields, as the Tartar of the steppes drives his flocks to browse on newer and on greener pastures—it is this almost mysterious love of change of situation that has in so few years, produced that wonderful revolution in the cotton trade of the world. Without this roving propensity, centuries could not have produced the effect that twenty years have accomplished. Other countries are as well adapted to cotton as the United States. There are the States along the Mediterranean Sea, there are many of the countries of Asia, there are the many islands of the Eastern Sea, but above all, there is wide-spread Brazil: these were all laboring upon cotton before the American people thought of it. But what then? The spirit that moved along the wilderness was wanting; the Pacha of Egypt may plan, other jealous governments may offer bounties and rewards, but that is wanting; that is wanting to the seekers after perpetual motion, life, and self-motion, in the mass that is to be acted upon. God has yet reserved to himself this vitality, and has neither yielded it up to the ruler or the ruled.

But to return from this digression, which it is hoped is not unnecessary, as the cause must ever precede the effect, and it was considered well to give the cause before we passed to the effects. As soon as the attention of the Southern States was called to the profitable cultivation of cotton, by a few persons along the shores of Georgia and Carolina, the cultivation began to be extended into the interior. The small quantity of cotton that had been grown for domestic uses, was exchanged for larger quantities to be prepared for sale. But the great difficulty to be overcome in the progress to extension, was to find out any instrument by which the cotton wool could be separated from the seed.

By this time various machines had been introduced for ginning the sea island cotton, but all of them ended at last in two rollers revolving upon each other, either longer or shorter, and moving with, some more, some less, velocity. These rollers were but badly adapted to the hairy cotton or second variety, which soon began to obtain the preference in the interior of Georgia and South Carolina, over the first or smooth leaved variety, and merited to obtain that preference, as giving when

separated from its downy seed, a finer and stronger although shorter fibre, and as perfecting its fruit sooner, but which it was almost impossible to separate with the rollers, because the down or fur upon the seed retained the seed hanging upon the roller, and denied admission to the rollers of the fresh cotton in the seed that was offered. Many plans were suggested, many substitutes for the rollers designed. All succeeded in part, but still they went on slow. Something was desired to do much in a short time: something that was strong enough to travel about without being broken to pieces, and light enough to move with its moving master. At last such a thing was found, in Miller and Whitney's gin, probably not the best machine that could have been designed, but so operative to its end, so efficient to its purpose, that it took possession of the whole ground; from thenceforward no other machine was sought for, and Miller and Whitney's gin is employed to separate the cotton seed from Virginia to Louisiana, save where the roller gin is used, and its use is now altogether confined to the sea island cotton, whose superior value is supposed to warrant the great increase of labor necessary in that mode of ginning. Miller and Whitney's gin was designed by Mr. Whitney and executed at the plantation of Mr. Miller, sixteen miles above Savannah, about the year 1795, and it seems to be derived from two machines already used upon cotton, a kind of cylindrical whipper, and the circular cards, before that time introduced in manufacturing cotton; a wooden shaft or roller enclosed within a wooden box. This roller or shaft has at every inch of its length a steel blade or saw, about a foot in diameter; above these saws is a box containing the cotton in the seed. The box has the bottom of nettle slits, through which the saws pass about an inch, and pulling of the cotton, but sometimes cutting the fibre as it passes. This revolving of the saws carries the cotton in the box gradually round until the seeds contained in the box are freed of the wool attached to them, when it is emptied of the seed and refilled with fresh cotton; it too often leaves some of the fibre behind it, which diminishes the quantity as well as injures the quality, so much so that the estimated difference of the products in these two modes of ginning are, with rollers 300 lbs. to the one 1000, and 250 lbs. to the 1000 with Miller and Whitney's gin. This gin having at last given a cheap and expeditious mode of taking the wool from the hairy American cotton, (for a gin that cost ten pounds sterling will clean a bale a day with a single horse acting upon the gin, with a hand wheel which any man can make for himself,) the cultivation of this description of cotton diverged in all directions around Georgia as the common centre: it went north into the two Carolinas; it went west into the hill country of all the Southern States; it was found capable of adjusting itself to the soil and climate of the interior country, which the Anguilla cotton had not been adapted to; still the fibre of the hairy or short staple cotton is better near the sea than in the interior. Above all, it is found to be most productive in alluvial soils that are a little touched with salt, as are some of the districts of Louisiana, where the rivers rising in the Rocky Mountains draw some of their waters through the salt and arid plants which separate the waters of the Arkansas from the waters of Red River, where these

two varieties of cotton, and a cotton that is possibly a hybrid between them, have arrived at the greatest perfection. It is there that soils which are deeply tinged with red, and heavily seasoned with salt, which all the tributary streams of Red River flowing in from the north, bring with them, give forth the most abundant crops, of the best quality of these descriptions of cotton. Directing myself by the information received from one or two friends who have property there, I should say, with reasonable diligence and attention to the object, 10.00 lbs. of seed cotton, or about 250 lbs. of cotton wool may be expected to the English acre, while the average products of the hill lands from the Mississippi to North Carolina should not be taken at more than 500 lbs. of seed cotton, or half the quantity, nor do I believe there is any material difference upon the great scale of products through this wide extent of country, judging for myself from personal observation, for I have passed through all these districts, yet scarcely a year passes without the newspapers announcing some new discovered land of promise within these wide limits, themselves misled by some single or partial result, or stimulated on by land speculators, a curse of no common character to a new country. But in whatever cause originating, the evil is the same. These rumors fall among a people already heated with a desire of change—a people quite sensible to present evils, but not reflective enough to hold in remembrance that every wave of the hand without necessity, and every momentary evolution of time without usefulness, is a waste of power and waste of time irreclaimable to humanity. The system of agriculture through all those districts, is essentially the same. You find the Virginian upon Red River; you find the North Carolina man, the South Carolina man, and the man from Georgia, along side of him; any improvements, any increased quantity of product, by any new course of cultivation, spreads like the fire of the American prairie, a spark has carried it, and enkindled it, far in advance of the mass of flame that rolls after it. Any substantial improvements therefore, that is made in Virginia, or Georgia, from this extension of mind, from this intermingling of men, is as likely to be reflected back upon the intermediate country from Red River, as to reach it, from its first source. The system of cultivation is therefore the same: the moment the cultivation of cotton spread into the interior country, from the shores of Georgia, and South Carolina, the hand-hoe was exchanged for the plough. The latter instrument had been employed at all times, and in all cultures in the hill country of the southern states; in no agricultural country were oxen or horses cheaper, in no agricultural country were soils freer for the plough-share, but it was not adapted to the sea coast, because the land is so little above the waters that ebb and flow, that many drains, inconvenient to the ploughman, are required to carry off the surface waters, the trees too, of necessity send their roots along the surface, rather than vertically in quest of moisture, and many of them like the live oak are scarcely destructible by time. They too obstruct his course; but above all, the plant under cultivation sends its roots around in quest rather of nourishment than down in quest of moisture, and must not be too rudely dealt with; these various causes, have finally, after long experience, fixed the hoe

husbandry upon the sea coast, and carried the plough husbandry into the hills. The short staple cotton, is therefore as exclusively cultivated by the plough, as the sea island cotton is exclusively cultivated by the hoe. The manner of treating the plant is really the same, the hoe dressing the land more neatly and garden like, the plough breaking up the land more radically, and extending far more widely its operation, for the quantity of force employed. The consequence has been, that while four English acres is the quantity cultivated upon the sea coast of Georgia, and Carolina with the hand hoe, eight acres is about the quantity cultivated of short staple cotton in the interior with the plough. It is the ridge husbandry in both instances that is now pursued, more neatly executed in the first instance by the hoe, and more roughly by the plough in the second, but still the same. The month of April is the best time of planting either variety. The distance between the ridges is most generally five feet, the plants left in the drills, varying from 6 to 24 inches, dependent as before stated upon the expected growth of the plants. Two other circumstances contributed to aid the cultivation of short staple, extrinsic of soil or real products. The winds of autumn are far more violent upon the sea coast of Georgia and Carolina, than in the interior country, and the capsules that contain the sea island cotton expand more than those that contain the short staple, so that the first has to be gathered much more frequently, from the fields than the last, or it falls to the ground, and is lost. The consequence is, the general gathering to the laborer, per day, is more than twice the quantity of short staple, than of sea island, for it is allowed to hang upon the plants, until they are white with the open cotton, so that there is only two and at best three gatherings of the one, to ten, or twelve scanty gleanings of the other. This one circumstance, more than any other, gives to the grower of short staple cotton, the power of something more than duplicating the quantity of cotton wool produced, by the same quantity of labor expended. But it is time, that we should look back, and see if there has been any thing omitted, necessary to be known, in the cultivation of the cotton plant or in preparing the cotton wool in the United States. Cottons of various kinds, grow well, and perfect their fruit, from the southern borders of Virginia, to the south western streams of the Mississippi, a space of 1200 miles, and from the sea, for 200 miles into the interior, through this wide space of country, in every soil, whether of clay, or loam, or even sand, the cotton plant will grow, and produce its seed and wool its accompaniment, provided the waters are kept well drained from the surface of the land. The quantity of products will of course depend upon the soils, whatever they may be, containing these ingredients which constitute fertility in all countries, which neither experiment, or the philosophy of chemistry has yet been able fully to discover, or define. The mean quantity given of 100 lbs. of sea island cotton wool, to the English acre, and of 125 lbs. of short staple cotton to the same quantity of land, we believe, not materially wrong, but the quantity of labor to bring forth these results, are very different. The sea island cotton is cultivated neatly by the hoe, the short staple more roughly by the plough, still it is, or should be, the ridge husbandry in both instances. The plants

are left to stand in drills upon the ridge, at distances from each other, graduated as before stated, to the expected growth of the plants from six inches, to two feet from each other, and bearing without injury to stand much nearer than at first sight may be imagined, for the cotton plant, does not occupy much space, with its roots, sending them down into the ground, and not over the surface, like white or grain crops, and drawing like all large leaved green crops, much of its nourishment from the atmosphere. It is not an exhaustor of soil, shading and protecting it from the sun, and soon by its decay, or by its combustion returning almost as much as it has taken away, but from the density of its shade, and the size and swell of its roots, it soon makes the soil too loose to sustain the plant, and the continued culture of the same soil, brings on a disease in the plant, greatly resembling the blight in wheat, and leaving a propensity in the seeds of cotton, to extend the evil, like the propensity in blighted wheat to extend and multiply, nor have I ever doubted, that in both instances, that the evil had originated, in insect depredations, for although Sir Joseph Banks discovered a fungous attaching itself to blighted wheat, I still believe, that the microscope discovered in that minute parasitic plant, the effects of injury previously received from something that lived, and moved, and had animal being. Fire therefore, I have always believed, and have always acted upon that belief, is the best security against this increasing and extending evil—all the weeds and grass, that are on the land should be burnt upon the surface of the land, leaving no vegetable matter to conceal and protect the germ, and by fermentation, to give heat and life to it; it is the neglect of this course which I think, has been the cause, that this evil, under various names, rot, and rust, and blight, has spread so widely as it has done, within a few years.

There is no plant, that requires the interchangeable husbandry more than the cotton plant, and there is no country, where that husbandry is more essential than in the Southern States. The cotton requires continued cleaning during the droughts of spring, and the heats of midsummer; these cleanings together with the shade and rapid growth of the plant, break up the soil, and leave it to be carried away, by the first violent autumnal rains. The best remedy is to give to the fields of cotton, intermediate crops of grain—as good a series as can well be adopted, is cotton, rye, and wheat where the soil is fit for it, pasture, and again cotton; a more extended rotation might be adopted, but as all root crops should be avoided in series with cotton, this simple tri-annual course, with manure applied during the grain year, to as great extent as may be convenient, will keep the field without material decay. When cotton was first introduced, the growers were misled as to the necessity of this change, by observing that the cotton plant upon new lands, grew large, and gave little fruit, and that it improved for the second and third year in productiveness, they unfortunately pushed the culture too far, until possibly to this cause, many of the diseases that have afflicted it in its growth may be attributed.

In a preceding part of this letter, the probable mean results, for these last 15 years, in growing sea island cotton, has been taken, at 90 dollars, or about 20 pounds sterling to the laborer, and taking

as we have already done in this letter, the medium crop of short staple, at 125 lbs. to the English acre, and eight acres of this cotton, as cultivated by the plough, it will give, 1000 lbs. of short staple cotton wool to each laborer employed upon it, which for the last 7 years may have given to the grower, a mean return of 10 cts. to the lb., or 100 dollars for the year's work. There are exceptions, unquestionably, to these estimates, a few men have received much higher prices, for their sea island cotton, and a few men have raised much larger quantities of both descriptions of cotton, to the acre, than are given; but exceptions can never serve as a guide, in conclusions, as to either the wealth, or productiveness of a whole country. The besetting sin of agricultural statements are exaggerations; and this arises from the simplest of all causes. Men do not go about, measuring the fields, and weighing the products of their neighbors, but they leave it to themselves, to measure and weigh. But it too often occurs, that he has done so, in imagination, before he was called to do so, in reality, and vanity mingles with disappointment, in denying his consent to go back, to unravel, to explain, or confirm the result. Why then it may be inquired, has a whole people so readily and so greedily adopted a course of cultivation, leading to so small individual benefit? There are many reasons; but there is one, sufficient to the end. It suits their wandering habits, it requires no great time to grow, it requires no great expense to prepare, and it will command money, less or more, wheresoever grown. But should we here pause to inquire, whether this delusion, will continue for always; whether 5,000,000, of Southern American people, will continue to labor for the benefit of others, rather than for the benefit of themselves, I think they will not, unless cotton gradually rises, to what is its real value. Is it not finer—Is it not lighter—Is it not more easily spun, and more easily woven than other wool? And does it in its various qualities sell for as much? Does it sell for as much as fur, as silk, as flax, or even hemp? It does not; and yet there is not one purpose, to which any one of these materials, can be applied, to which cotton cannot as well, or even better, be applied. From the Court Lady, that is fluttering around the throne of Louis Philip, to the ship that sails across the sea, all are better clothed in cotton, than they can be clothed in any thing else; for the one cannot be more pure or stainless, than the robe she wears and the night dew that falls upon the sails of the other, will not rot or destroy them, but will swell and thicken them, to the wind. Cotton has yet to be applied to many purposes to which it has not yet been applied, if it were possible to suppose, that the supply could keep pace with its multiplying uses; but the American people have at length, reached, in the cotton region, the bounds of the American empire. Tribes of red men, will separate them, from Mexico/ The roll of population to the west will be stayed. Within the present limits, the laborer whether white or black, has full employment, and none of them, more unprofitably, than those employed in the cultivation of cotton. Rice gives a better return, sugar in many districts gives a better return, wheat in its appropriate place, gives a better return, indigo, an ancient staple of the country, would give a better return. Those hills that are now wasting away with continued summer ploughings, under cotton, will be-

fore many years, be shaded, and protected by mulberry trees, feeding silk worms, that will give a better return, to those, that watch and labor upon them. Cotton must take its real and relative value, among the gifts of God—or its growers will leave the wrangling governments, that have done what they could do to destroy it, to quarrel over its remains.

But the writer of this letter, has no where permitted the pen fully to express, all the mind felt upon the subject. The once generous and gallant men of Spain, had been nigh devoured by sheep; the still more generous and still more gallant men of England, and of Scotland, were in danger of being devoured by sheep, when the growers of cotton, came to the rescue—and how have they been rewarded? Let the legislation, for many years, of England, and of the United States tell.

It would have been easy to have added to this letter tabular statements, of the progressive increase, in the growth, and in the manufactory, of cotton wool; but every bookseller's shop, in every town, in England, will give them.

THOS. SPALDING,
Of Sapalo Island, near Darien, Georgia.

MARL BANKS AND PAPER BANKS.
To the Editor of the Farmers' Register.

Eastern Shore, Maryland, 23rd Sept., 1834.

Two summers ago, I derived much pleasure and instruction, from reading your 'Treatise on Calcareous Manures. At the time, I was engaged in clearing and ditching a swamp, in one of my fields. About twelve inches below the surface, I found a stratum of earth, corresponding with the description you give of marl, not calcareous. I tried it by one of the tests you mention, by dropping a piece well dried in a tumbler of water, and it fully answered, by crumbling and shooting up sparkles to the surface. I became perfectly satisfied that it contained no calcareous particles, by testing it, by a solution of muriatic acid. Last autumn I sowed the field in wheat, and applied to its improvement a considerable quantity of calcareous marl, and as much putrescent manure as I could collect, and by way of experiment, I carried out a few cart loads of the earth first mentioned. It was spread on a part of the field which had been entirely exhausted by hard cultivation—the land immediately adjoining, I was unable to assist—the product at harvest, where this earth had been spread, was more than double that of the adjoining land. In the spring of 1831, the field above mentioned was seeded in oats and clover, and where the experiment was made, the clover has grown with great vigor, and the sorrel has disappeared. When I again cultivate this field, I intend to apply this marl largely; I have full confidence in its value, and I have no doubt it extends generally through our country, with many other sources of improvement, which might be developed by a little attention and expense. Many of the farmers in this part of the country, who have something to spare after paying expenses and supporting their families, have been fond to place it in the banks. But I am inclined to think, the recent disasters, in some of these institutions, will render them more wary. The best application that a

farmer can make, of any little surplus he may have, is to the improvement of his lands. The deposit is always safe, and will pay a good interest. When a farmer places his money in a bank, he is most frequently without a knowledge of the persons he trusts. It often happens that the president, cashier, and active directors of a bank, have but small interest in the institution, beyond the facilities it affords them, for schemes and speculations; and when the bank fails, he learns for the first time that its active agents were bold, desperate speculators—one engaged in building a new town, another in constructing a rail road, and a third in clearing out a gold mine in Mexico. The fruits of many a hard day's toil are thus lost forever, and he is left to seek satisfaction against the defaulters, by an indictment for a conspiracy, which after remaining a decent cooling time in court, generally fails, for defect in the law, or defect in its execution. Farmers like other classes, have their full share of vanity, and some of them in addition to an easy profit, think they deserve consequence from having money vested in bank stock.

Not a great while ago, Simon Placid lost his dwelling by fire. Simon, like his father before him, cultivated his farm on the old three shift system, and deemed himself fortunate in always keeping out of the hands of the sheriff. Having no funds to rebuild his house, he applied to his neighbor, Solomon Thrifty, for a loan of two thousand dollars. Solomon professed much sorrow for his neighbor's misfortune, and consequent discomfort of Mrs. Placid and the children; but his money was all safe in the bank, the interest punctually paid, and he could not break his capital. As the next dividend day approached, Solomon, after calculating the amount, went to bed and soon fell into a slumber, and dreamed that he saw the bank swept from its foundation by a tornado, and the bank notes scattered to the four winds—he started and awoke, and rejoiced that it was only a dream. Next morning the occurrence was remembered, and he thought it strange that such a vagary should have entered his mind in his sleep, as he had never entertained any such apprehensions when awake. He, notwithstanding, felt restless, had but little appetite for his breakfast, and in the course of the morning, rode to the next public landing to get his newspapers. The packet had just arrived and brought the astounding intelligence, that Solomon's bank had failed, and that some of the fraudulent directors, and fraudulent officers, had swept both counter and vaults. In his melancholy ride home, he passed Simon's farm, and for the first time, thought that Simon's naked chimneys were an ugly object in the neighborhood, and that they would have looked better, if Simon's house had been rebuilt and he had his bond for the money.

PEACH AND NECTARINE.

It is useful to distinguish peach and nectarine trees from each other, at an early stage of their growth, when both first produce their blossoms, before fruiting. To effect this, dissect a few of the flowers of the trees about which you doubt; and a tree which produces villose germens always proves a peach tree, and a tree producing germens smooth and shining proves a nectarine tree.—*Gard. Mag.*

COOLEY'S THRASHING MACHINE—EASTERN SHORE IMPROVEMENTS.

To the Editor of the Farmers' Register.

*Wye, Queen Ann's County, Eastern Shore, }
Maryland, 23rd September, 1834.*

A thrashing machine was introduced last year into this part of the country, made by S. Cooley, of Philadelphia. I was so much pleased with its performance, that I purchased one, and have used it with much satisfaction and success. I one day made a trial of its power, and thrashed out one hundred and twenty-six bushels of wheat in three successive hours; and during the thrashing season, it did good expeditious work. I think the horse-power peculiarly valuable. It is strong and simple, four horses carry it with ease. The thrasher and horse-power may be removed from farm to farm, and it requires but small skill, and but little expense, to set it up. From the structure of the horse-power, it cannot be conveniently used in a barn, and the wheat falling on an earthen floor, is liable to dust. I understand that the rice growers of the South, have a method of hardening their thrashing floors, and making them firm and solid. Information of the means by which it is done, would be useful to all who use Cooley's machine, and I solicit a communication on the subject through your Register, either from yourself or some other gentleman.

I am pleased to say to you, that a spirit of agricultural inquiry, and improvement, is rising in our part of the country, and that your book on calcareous manures, and your Register, has contributed much to excite it.

Mr. Jeremiah Nicola, of Kent County, by a small alteration of one of Sinclair & Moor's wheat ans, has chaffed more than two hundred bushels of wheat in one hour. This I have his word for, on which entire reliance is to be placed; and I have also seen a certificate from gentlemen who saw the fan work, who are entitled to the fullest confidence.

WM. CARMICHAEL.

APPARATUS FOR ANALYSING MARL, AND THE CARBONATES IN GENERAL.

To the Editor of the Farmers' Register.

William and Mary College, June 27th, 1834.

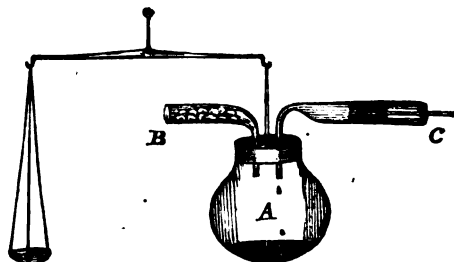
The apparatus which I am about to describe, is intended to give greater accuracy and facility to the usual process for determining the quantity of carbonic acid in marl, or in any of the carbonates. By the common method, the two vessels containing severally the marl and the muriatic acid are placed in one of the scales of a delicate balance, and there counterpoised by weights put into the other scale. The acid is then poured upon the marl, and after all the carbonic acid has been discharged, the equilibrium is restored by adding weights to one, or abstracting them from the other scale. In principle, this method is entirely free from objection: but as usually conducted, it cannot be relied upon as accurate. This want of precision arises, in the first place, from the escape of aqueous vapor, along with the carbonic acid which is discharged, thus making a greater weight necessary for restoring the equilibrium, than is due to the quantity of carbonic acid which has escaped—and secondly, from the greater weight of the

vessels containing the marl and acid impairing the sensibility of the balance, and thus rendering it impossible to estimate the carbonic acid to small fractions of a grain. The first of these objections has long been obviated in the chemical analysis of the carbonates, by causing the gas as it escapes to pass through a tube containing dried muriate of lime; and the latter has been in some measure removed, by a contrivance of the great practical chemist Rose; which, however, as it is inconvenient and uncertain in the manipulation, I shall not here describe.

The apparatus which I have devised, is, I think, free from these objections, and enables the operator to proceed with great accuracy and despatch. It has the advantage of being very easily constructed, and of being used with a balance that can be procured at a very moderate price. Moreover, the quantity of marl which is necessary for experiment in no case exceeding ten grains, specimens for analysis may very easily be forwarded by letter.

The balance which I use with this apparatus, is a small goldsmith's balance—such as may be procured for a few dollars in New York. It is very light and turns, when unloaded, with the $\frac{1}{100}$ th of a grain. My set of weights obtained from Millington in Philadelphia, extends to tenths and hundredths of the grain.

The accompanying figure will convey a distinct idea of the apparatus and mode of using it. One of the scales is removed to admit of suspending the apparatus by a double thread over the hook of the beam. The other is made of something light, as a piece of card. In this way all unnecessary weight upon the beam is avoided, and its sensibility preserved.



A, is a light bulb of glass, blown very thin from a common piece of tube, and about one inch in diameter. A cork is fitted to its mouth, and through this the tapered ends of the bent glass tubes, B and C, are passed air tight; the extremity of the latter extending some distance into the vessel. The tube B, through which the gas escapes, is filled with fragments of muriate of lime. The tube C, which contains the muriatic acid, is furnished with a light piston of cork or cotton, in the centre of which is fixed a rod or handle, made of a small stiff straw. This instrument, when charged with marl and acid, does not weigh more than 120 grains. The whole load of the beam is therefore 240 grains, and it is still sensible to the $\frac{1}{100}$ th of a grain.

The mode of proceeding with the analysis is as follows. Five or ten grains of the finely powdered marl is introduced into the vessel A, and then two or three drops of water added, to assist the diffu-

sion of the acid. The small end of the tube C, now removed from the cork, is dipped into some muriatic acid in a wine glass, and the piston moved backwards and forwards until the necessary quantity of acid has been drawn in. The tube is then replaced in the cork, and in this state the instrument is counterpoised by weights in the opposite scale. The piston being then gradually forced in, the acid is injected drop by drop upon the marl, and the gas escapes by the tube B, depositing the aqueous vapor in its passage, on the muriate of lime. Allowing the apparatus to rest until the gas has entirely escaped, and the decomposition is complete, the equilibrium is restored by placing weights upon the clear top of the cork, or by removing weights from the scale. In this way the weight of the disengaged gas is accurately determined, and the proportion of carbonate of lime thence computed.

An analysis of a specimen of marl from James City, just completed, will serve as an illustration of the method. Ten grains of the finely powdered marl was introduced with a little water into the vessel A, the instrument was then charged and equipoised. The acid being injected, the whole was allowed to rest for an hour. The weight lost was 2.91 grains. Increasing this in the ratio of 44 to 100, gives 6.61 grains of carbonate of lime in the 10 grains of marl—or almost precisely 66 per cent.

The frequent calls upon me for the analysis of specimens of marl, first led me to the construction of this apparatus, and I have since found it so convenient and accurate, that I can recommend its adoption to such of your readers as may have a taste for chemical inquiries connected with agriculture. Any ordinary worker in glass will construct the instrument, and skill in manipulating with it may be soon and easily acquired.

WM. B. ROGERS.

[The farmers who are using marl will be greatly indebted to Professor Rogers for the convenient and cheap little apparatus above described—which, judging from his description, not only furnishes the cheapest and most convenient, but likewise the most accurate mode of analysing calcareous manures. It may be easily constructed by any worker in glass—so easily indeed, that Mr. Rogers made his own by the heat of an Argand lamp, using a few common glass tubes as materials. Every farmer who uses calcareous manures ought to have some means for testing their strength, and this seems to be completely within the power of all to obtain, and to make use of, with very little attention. But though the process, as above described, is sufficiently plain to all who have the slightest knowledge of the chemical properties of the substances used, it may appear unintelligible to others; and therefore we hope that the following explanations may be pardoned by those to whom they are altogether useless.

The principle upon which the apparatus works, is the same as that of the more expensive and complicated apparatus of Davy, (described in his *Agricultural Chemistry*) which we have heretofore considered the best—that is, by separating and ascertaining the weight of the carbonic acid combined with the lime of the manure. Every hundred grains of calcareous earth or

carbonate of lime, is composed always of similar proportions of lime and of carbonic acid—which proportions, by weight, are 56 parts of lime, and 44 of carbonic acid. Of course, if we know how much weight is lost in 100 grains of earth partly of carbonate of lime, (as marl,) by driving off its carbonic acid, the rule of proportion will show what was the amount of carbonate of lime contained in the sample of earth.

When the muriatic acid reaches the earth in the bulb, it immediately combines with the lime by its greater attraction, and the weaker carbonic acid is disengaged in the form of gas, and escapes into the air through the tube containing the dry muriate of lime—which substance attracts moisture so powerfully, as to retain all that might otherwise pass out with the gas. The same muriate of lime will serve for many experiments, as by being heated in the tube, its dryness is restored previous to every trial. This salt is formed by the combination of muriatic acid with lime—and therefore every experimenter may provide it for himself, by filtering and evaporating the fluid left in this process of decomposing carbonate of lime.]

MEXICAN PIGGERIES.

[The following article furnishes the account of the Mexican piggeries, of which a correspondent made inquiry in a former number of the Farmers' Register. It may serve to amuse our readers—but it is not likely to induce any to place their pigs upon so princely an establishment.]

From Bullock's Travels in Mexico.

"In the piggeries, they will have from 800 to 1000 swine in number confined in styes of well built sheds, about 30 feet deep, with roofs descending very low; and having the entrance through low arches, before which is an open space the whole length of the yard, and about 24 feet wide, in the centre of which is a kind of aqueduct, built of stone, and filled with clean water; supplied from a well at the end of the premises. The hogs can only put their noses into this water through holes in the wall, which prevents their dirtying it, as it passes through the whole division of the yard. This is the only liquid given them: and their food, maize or Indian corn, slightly moistened, and scattered at stated hours on the ground, which in the yard as well as the place where they sleep is perfectly dry and clean. Two Indian lads are employed, from morning till night, in settling disputes, or little bickerings, that may arise among the happy inhabitants of this community, and in singing them to sleep. The boys are chosen for the strength of their lungs, and their taste and judgement in delighting the ears and lulling the senses of this amiable harmonic society;—and succeed each other in chaunting during the whole day, to the great delight and edification of the audience, who seem fully to appreciate the merits of the performers. The proprietor of one of those establishments himself attended us, and explained the use of the various apartments. He assured me that the premises cost him 60,000 dollars, and that his sales amounted to about 2000 dollars per week; indeed, his display of diamonds, and his three splendid carriages with fine horses standing in the yard, bespoke him a man of some opulence and

importance. His stock are bred at a farm belonging to him at Otumba, and driven to Mexico to be fattened, when eight months old.

FORCING EARLY BEANS.

From the Gardener's Magazine.

In the month of November last, when digging the ground where the crop of scarlet runners [beans] had grown, I could not help noticing the large size of the roots; and it occurred to me that, if I took them up, potted them, and kept them in a cold pit during the winter, they might furnish another crop the following spring. I tried the experiment on two of the best roots, potting them, and keeping them in a cold pit till the 1st of February. At that time I put them into a hot-house, in which the average temperature was about 60°. They soon began to send up strong shoots, and to show flower in abundance from the ground upwards. They are now about 12 feet high, and make a very good appearance in a green-house, where they pass with many for a new species of plant. If I had saved thirty or forty roots, and had put them in heat in spring, in the manner done with georginas, and if I had turned them out in the open air about the same time that these plants are turned out, I certainly should have been able to gather kidney beans a month sooner than is done by the usual practice of sowing in the open garden.

ON THE IMPROVEMENT OF AGRICULTURE.

Addressed to the Agricultural Society of Charlotte.

For the Farmers' Register.

There can be no doubt that practical essays are better calculated to promote the interests of agriculture, than mere theoretical opinions. As my practice however, has not been the most successful, and I feel my deficiency in practical operations generally, I shall not attempt to offer any thing in this way, but confine myself to such observations as may seem to me suitable to the present occasion.

We must all deplore the careless and neglected condition of agriculture generally in this and the adjacent counties.

At a time when every effort is making in some of our sister States, and in some of the counties of our own State, to advance the cause of agriculture, by the dissemination of enlightened views on the subject, it is our melancholy lot to witness its decline.

The cultivation of the soil which ought to be looked upon as a source of wealth and independence, in many cases, proves to be the road to poverty and ruin—and rural occupations, instead of being esteemed of the highest importance, are sunk into a state of degradation. Our lands are cultivated as if we had no permanent interest in them, and as if it were a matter of course, that in a few years we were to throw ourselves into, and float along the current of western emigration. Misguided avarice, or an unaccountable apathy seems to operate upon us, and the mandate of a despot could not more effectually drive us from our native soil. The wretched system of cultivation we are pursuing, the exhausting nature of our crops, (corn, wheat, and tobacco,) with scarcely any meli-

orating process, and the consequent rapid decline in the fertility of our soil, are fast destroying our attachment to our country, and driving us to seek an asylum from poverty and want, in the rich lands of the west. For our country to be loved, (as Burke says) she must be made lovely. But who can say that at this time the agricultural condition of this section presents a lovely aspect? Does it not, on the contrary, present us with many bitter reflections on the past, sad contrasts of the present, and gloomy and desponding apprehensions of the future? But we must not despair. Patriotism bids us exert all our energies, to make Virginia a lovely spot. For it is here that the bones of our fathers rest. Here upon our altars did the pure flame of liberty first blaze up, and hence did the mighty conflagration spread itself, until the bands of British despotism were melted away, America freed, and the world taught the glorious truth, that the *liberty* of the citizen was not inconsistent with *good government*. The same spirit, which achieved our liberties still exists in our bosoms. She calls on us to nerve ourselves for a generous effort. Let us not despond. Let not the spirit of patriotism call on us in vain. This Society may expect to be opposed by some, ridiculed by others, and regarded with indifference by the majority. But the patriot is not to be driven from his purpose by trifling difficulties. His aim is high, and he enjoys more real happiness in well-meant endeavors for his country's good, than the cold hearted bigot to his own prejudices can ever taste.

I know that our resources have been weakened and diminished. But well-directed skill and diligence will help to make up for this. Our soil has been impoverished, but still enough remains to enable us to adopt a new system of cultivation. Gloomy as the prospect appears, I do not despair of yet seeing our soil, susceptible of improvement as it is, clothed with verdure. Nature has lavished her favors upon us. Our country is peculiarly adapted to farming—its products are highly diversified—we are not tied down necessarily to any one staple: grain, grass, tobacco, hemp, flax, and the various root crops all grow well. It lies beautifully; is intersected with many fine, bold, navigable streams, and both inland and seaport towns afford a market for our produce of every variety. A sufficient portion of the soil is naturally fertile, and (although much worn) still susceptible of the highest degree of improvement. The climate is one of the most pleasant and salubrious in the world. Every thing in short, but the obstinate prejudices and apathy of our fellow citizens, combines to make it one of the finest spots on the habitable globe.

Why then, it may be asked, with a soil naturally good, and so many and so great advantages, does not the cause of agriculture flourish? In addition to the causes already mentioned, is the pertinacious adherence to old customs, and a disposition, inherent in man, to tread the path of his fathers. To a certain extent I approve this disposition, but he is not wise, who when he sees the errors of those who have gone before him, does not avoid them—who when he sees the rocks on which they are wrecked, rushes heedlessly on to the same destruction. Our eyes are now fully open to the faults of our predecessors. The ravages which their injudicious cultivation has made on the beauty of our soil, are sufficiently manifest wherever

we go. Our gullies glare horribly upon us, and like the ghost of Banquo, tell of murder. But we will not dwell on those fatal errors of our fathers. They more than paid us for all the wrongs they committed, in handing down a *legacy* that makes even the barren hills rejoice—*liberty—thrice blessed liberty*.

With these views, I shall, to the best of my ability, point out the obvious means of amelioration and improvement.

Our farms are generally too large to look for any thing like fertility throughout. And many of them are so generally exhausted, that years must elapse before they can exhibit one scene of high cultivation and improvement. It seems conceded by those who have enjoyed the most favorable opportunity of testing the efficacy of the grasses, that no calculation can be made upon them, unaided by animal manure, or some foreign substance, such as marl, or gypsum. And such is our distance from the large cities, that we cannot procure the manures which are used so plentifully and profitably by farmers in their immediate neighborhoods. Our dependence then must be chiefly upon the resources of our own farms. Our tobacco crops must be curtailed—our manuring schemes must not be confined exclusively to the tobacco lands. The scene of our manuring operations must be shifted every year, and extended to the utmost reach of our means, and where it is practicable to get plaster, marl, or lime, to add to the amount of product beyond what it cost to procure it, and use it—it ought to be used. Every nook and corner of the country ought to be ransacked to ascertain the existence of calcareous or other mineral substances suitable for manure. No labor ought to be spared in the collection of vegetable substances, to mix with and retain the manures from our stables, farm pens, sheep folds, &c. Every particle of the litter about our out houses, poultry yards, and other places should be carefully collected, and put upon our lands. I doubt not that much more may be done in this way, than is generally supposed. In all the fence corners, feeding places, ditch banks, ponds, &c. resources exist, which are generally entirely lost. Whenever the soil is of a tenacious, close character, containing too much clay, much may be done by the application of sand: where it is too light, clay may possibly increase its fertility. Where it is gullied and washing, deep ploughing and coarse litter may be successfully used. In many situations irrigation will be found a most efficient manure, as draining is in others. In short, a thousand sources exist. Even oak leaves constitute a very valuable manure on close tenacious soils.

When we look at this subject, we must admit that limited as our resources may appear, they are sufficient for more extended application on almost every farm; so that the farmer who does nothing towards the improvement of his soil, is left without excuse. The folly of the plan generally adopted is too evident to require exposure. According to the little observation I have made, the common mode is to put all the litter of the farm upon small tobacco lots, which are thus kept rich at the expense of the whole farm. The most superficial observer must see at once that this is a wretched system—a system which is diminishing every year its own sources, lessening the crops of grain, grasses, &c. and thus breaking up the chan-

nels through which its very existence is kept up. And after a while these lots failing of their accustomed supplies of litter, in their turn, become poor, and the whole farm thus managed, soon presents a scene of sterility and waste, and the proprietor is driven by sheer necessity (as I said before) to seek an asylum in the alluvial lands of the far West. But let us manure our lands for grain; let us extend our fields of operation, by increased diligence and economy, and change them every year; and thus with the increase of our grain crops will be the increase of our means of extending our operations, the increase of our comforts, and the increase of the beauty, production, and prosperity of our country.

But you are ready to ask, what shall we do for tobacco lands? I answer, that those who have them not, must cease to cultivate the article; and those who have them, must keep them up, by the help of clover and plaster. At a former meeting I advanced the opinion, that lands already rich, may be kept so, by the use of clover; and I doubt not the addition of plaster will raise them to the highest point of fertility. I know it must be long before our tobacco lands generally can be brought to a state so desirable, but every one ought to make it his aim to bring it to this point. We have every encouragement to go on, and however slow our progress, it is of the utmost importance that it be onward.

It is vain and fruitless to rely on the grasses alone, on soils not rich enough to produce them. It is easy matter to keep rich land rich, but he who lives upon poor land, must be content if by the judicious application of his means, he can see a gradual and progressive improvement. Let us then, gentlemen, try what we can do—let us preserve our tobacco lands as well as we can by the help of clover and plaster, and let our future efforts be chiefly directed to the improvement of other lands, and the increased production of articles suitable for sustenance, for man and beast; and thus, as I before said, will our resources for the enlargement of our manuring schemes be proportionably increased, and thus may this ratio of production and extension be carried on, until every waste plain shall become a garden, and every field smile with plenty.

Can the patriot contemplate such a revolution without having his heart thrill with rapture? And while so much is to be done can he sit down quietly, and with folded arms wait for others to perform the task of putting this revolution in motion? No, he cannot. The bare possibility of such a change will command his best exertions. We, gentlemen, have, I hope, associated ourselves for the purpose of aiding to bring about such a revolution. Although our number is as yet small, we have reason to hope we have engaged in the cause with a spirit that will carry us through triumphantly. Let us then, having put our hands to the plough never look back—let us cultivate those social and friendly feelings which a common cause ought to inspire—let us impart all the light we can obtain on the various objects for which we are associated—let us not be discouraged if our progress should be slow, and our difficulties great; but let us press on, determined that we will not relax our exertions until the spirit of enterprise and improvement which now slumbers in the bosoms of our fellow citizens, be roused to efficient operation, and the desolations of our beloved Virginia

shall give place to rich meadows and verdant fields, and all the joys of a highly cultivated and plentiful country. I sincerely believe that the formation of this Society is an important era, and I rejoice to see so much interest excited by the subject in the minds of the public. I confidently look forward to the time when its labors shall command the gratitude of every truly patriotic citizen in this country. In the mean time, let us set our faces like flint to the accomplishment of our grand object, the general advancement of the cause throughout this country.

ON THE CULTIVATION OF FRUIT TREES.

Addressed to the Agricultural Society of Charlotte.

For the Farmers' Register.

The subject to which I invite your attention, is the cultivation of fruit trees. Among all the rural pursuits none can be more interesting than this, whether considered as a means of gratifying our palates, or ornamenting our farms. In this branch of economy, we have been left far behind by some of our sister States. It would doubtless be matter of surprise to some, to see an estimate of the amount of money annually laid out by the people of Virginia for fruit and cider, in the States north of this, which, we hazard the assertion, can be as well raised here, and at less expense, than they can be in those States, on account of our superabundance of land, which enables the planter to spare enough, without curtailing his crops; while they, for the most part, have to appropriate lands to that object, which might be otherwise very profitably cultivated in grain, grass, or root crops.

I need scarcely urge upon the minds of any present, the importance of bestowing some attention to this subject. Many of our best managers, however, regard the subject with so little attention, that it is rare to meet with a good orchard on their farms; and few of our tables are supplied with the choicest varieties of fruit. It has been said that he who makes two blades of grass grow where only one grew before, deserves well of his country. It may be as truly said of him who plants a good orchard, or introduces a new variety of good fruit—for every such introduction adds much to our enjoyment. I know in some instances single trees to afford more good eating than can be procured by ten times the trouble and expense in any other way. A friend of mine has a tree that produces apples of the most delicious flavor, in constant succession, from the first of June till August, affording a plentiful supply for a large family, and frequent treats for his neighbors. The introduction of this tree could not have been attended with much expense, and while affording such an ample supply of fruit, is highly ornamental, and an excellent shade—standing in the yard, and occupying no more ground than would have been taken up by some useless tree.

It would be difficult to account for the negligence of our farmers on this subject. Some impute it to the all-absorbing crop of tobacco, others to the spirit of emigration, but in general, I think it may be imputed to a want of diligence and forecast. None of these causes, however, constitute a sufficient excuse for a total neglect of the matter, especially when we consider that a few hours manual labor at the proper season, will lay the groundwork of an excellent orchard. I cannot deny,

however, that a spirit of emigration is the bane of all improvements in rural life; for men are not apt to do much towards such improvements when they calculate on abandoning them in a few years. But it is to be hoped that this spirit is subsiding, and a spirit of improvement gaining ground. When we see on every farm fine orchards of the best fruits, we may conclude that the proprietor loves the soil on which he lives, and the more he does towards such improvements the stronger his attachment becomes. But where this attachment is not cherished, but little of improvement of any sort can be expected. Every man has it in his power to furnish himself with an orchard of the best fruit by a small degree of attention. As I have had some experience in this business, I propose to lay before the Society the results of that experience; hoping that if I present nothing new, I may succeed in exciting the interest and drawing out the views of others more able to give us light on this subject.

I shall, in the first place, invite your attention to the various modes adopted for the propagation of, and raising the trees, and the comparative success attending each mode practised by me.

The apple tree may be successfully raised by budding or grafting, (terms I presume well understood) but grafting with me has been far the most successful. When budded, (or as it is frequently termed inoculated) the body of the tree below the insertion of the bud, is liable to put out suckers, which become troublesome, and hinder the growth of the tree. The bud is more liable to perish than the graft. In preparing stocks for grafting it is very important to provide those raised from the seed, as they are free from suckers, while stocks taken from the roots or sides of old trees are ever sending up shoots from the roots, which are troublesome to destroy, and if not often cut away, seriously impede the growth of the tree. I have found trees grafted on seedling stocks, more certain to live, more vigorous in their growth, and of handsomer shape. When the seedling stocks have been scarce, I have frequently cut the roots in pieces, so as to make every root a stock, with complete success—and this plan is worthy of attention, for stocks are frequently very scarce, and in that case five or six stocks may be obtained from the roots of a small tree.

The peach tree I have raised both by budding, grafting, and planting the stones. When the stones of the best varieties can be readily obtained, I should not hesitate to rely upon them. But all authors on the peach tree concur in the opinion, that there is always uncertainty in getting the genuine kind in this way; and my own experience has taught me that stones from the same tree produce fruit slightly varying from the original in shape, size, and flavor—but I always expect to get some as much improved as others are deteriorated by this plan. But when stones cannot be readily come at, I prefer budding, as more certain as to the kind, more rapid in the growth, and earlier in bearing, while grafting has always proved uncertain, especially on the peach stock. I cannot give greater force to this opinion than by giving the result of an experiment made by me four or five years ago. I obtained from an orchard some twenty-five miles distant, slips nicely cut from many different varieties, to the number of one hundred. I had previously raised stocks from

the peach stones, upon which I grafted ninety of the hundred, when my peach stocks giving out, I was reduced to the necessity of resorting to the wild plum stock, dug up from the roots of old trees. The result of the experiment was that out of the ninety grafted upon the peach stock, (it turning out a dry season) I did not save a single tree, while from the ten grafted on the plum stocks, I obtained five thrifty trees. The result of this experiment I considered conclusive as to the comparative merit of the plum and peach stock as a basis for the peach tree. It is not my purpose to enter into the philosophy of the thing, but will simply remark, that I have found the root of the plum less subject to the depredation of the worm (of which I shall again have occasion to speak) than that of the peach, which may account for the difference in the result of the two modes of grafting. All my experiments, however, in grafting the peach have been unsuccessful, while those in budding have proven less troublesome, more successful, and certain as to the kind. I therefore give the budding a decided preference, as well as on account of the facility it affords of propagating any favorite variety at any time in summer. The best time of budding is from the first to the last of June. In the choice of stocks, I have made numerous experiments. The peach budded on the wild plum stock, has grown too rapidly for the stock, sometimes attaining double the size, and such a weight as brought the head of the tree to the ground.

The pear I have found to succeed much better, grow more thrifflily, and bear earlier from the bud than the graft, and is the easiest to raise by budding of all the trees I have raised. In grafting the pear, I have generally failed, but have made no satisfactory discovery of the cause of my failure.

The plum I have raised successfully both by budding and grafting, but prefer grafting, as the most certain, and as affording the finest tree. I have found it difficult to provide suitable stocks for the foreign varieties of plums. The common wild plum of the country not being sufficiently vigorous to keep pace with these varieties, the tree soon becomes too heavy for the size and strength of the stock. The plum raised from the stone rarely produces the same kind of fruit, and is apt to be indifferent.

The apricot may be raised by budding or grafting. My experiments on this tree, have been confined to budding, and have not been generally attended with success. Indeed I have found it very difficult to raise, owing, as I suppose, to the thinness of the bark, and to the fact that the bark is composed of two roots, which are very apt to separate in the operation; and also to the projection of the wood under the bud, which makes it difficult to fit the bud to the wood of the stock without bruising.

I might invite your attention to other varieties of fruit, but I do not wish to occupy too much time on the subject. There are many garden fruits well worthy the attention of the Society, but as those varieties I have mentioned are the most important, I shall confine myself to them, and proceed to point out some of the diseases to which they are subject, with the remedies I have applied.

The apple, so far as it has come under my ob-

servation, has but few enemies to contend with. It seems to flourish in all our soils that have sufficient fertility to grow a tree of any kind, and I believe requires nothing but good culture and careful pruning. Injudicious pruning, however, often injures the tree. But few of the insect tribe feed upon the apple tree, and of that few the common caterpillar is the only one that ever seriously injures the tree. It may be found enveloped in great numbers in a web as soon as the leaves begin to grow in the spring. The most effectual mode of destroying them is to go while they are yet young, with a forked stick, and twist the web out, when they are all in it, which will be at all times of the day when the influence of the sun is sensibly felt. Another enemy to the apple tree, especially while in its infancy, is the common hare. They are very fond of the bark of young trees, and frequently destroy them. I have successfully prevented this depredation by occasionally killing one, splitting his body, and rubbing it up and down the tree, so as to leave it bloody, or strongly scented by the flesh. Another remedy equally efficacious is to provide a plenty of corn stalks about two and a half feet long, split them on one side, scrape out the pith, and let the tree into it by opening the split, which will effectually secure the tree.

The peach tree is not so fortunate as the apple. It has enemies at the branch, and another at the root. There is a small black insect that preys on the tree, both above and below ground, commencing its operation of sucking the sap as soon as it begins to flow, and they increase in number, until the tree is literally sucked to death. They are particularly fatal to the tree in its infancy—but they pursue their depredations to the well grown tree, often destroying it after it begins to bear, covering it from the roots to the very top-most branch. Hitherto I have heard of no certain remedy for this evil. I am careful to scrape away any that may be found about my young trees when taken from the nursery to plant out. There is at the root of the tree another equally destructive enemy, more secret in his ravages, yet more in the reach of our means to destroy. This is a worm about an inch long when full grown. The egg is deposited at the surface of the earth, by what is by some called the wasp, from its resemblance to that insect. In the fall it hatches, and at once commences its depredations by perforating through the outercoat to the soft part of the bark next the wood, and in some cases, perforating the wood itself. As they grow larger they descend lower into the root of the tree. In the spring they attain their full size, and about the first of April may be found just at the surface of the earth, adhering to the tree, enveloped in a thin earthy covering, resembling the nest of the dirt dauber, (as it is commonly called) only of a darker complexion. I have never traced it farther than this. My plan for destroying this insect, is to commence early in March examining my trees, and whenever I discover a dark appearance about the root of the tree, occasioned by the gum exuding from the root, always indicating the presence of the worm, I dig away the earth, and with a common pocket knife commence tracing from these gummy appearances, the rout of the destroyer, and never cease my search until I get him into my power. Sometimes a dozen will be found in the roots of one tree, and if they are allowed to remain the

tree is inevitably destroyed. By a careful attention to this plan I have preserved the trees in a considerable orchard, scarcely ever losing one. There is another enemy that confines his ravages to the fruit itself. It effects its work of destruction by perforating the fruit, and depositing its eggs, producing a worm which no sooner hatches than it commences its journey to the stone of the fruit, causing it to wither and fall. This is of all the enemies of our stone fruit, the most destructive, and the most provokingly so, as he blights the fruit when it has escaped the frost. This insect is called the curculio, and may be found after sunset, or in cloudy days, carrying on its work of destruction. It resembles the bug that perforates the chinquapin—that I presume is familiar to most of us. I hope that this subject will continue, as it has done heretofore, to command the attention and researches of the naturalists and orchardists of this and other countries, until some remedy is discovered for the evil; and he who shall make this discovery will merit the thanks of his country. All stone fruit trees are more or less subject to the depredation of the two last mentioned insects.

The pear and plum trees are subject to the ravages of an insect that devours the soft bark between the outer coat and the wood. It is the more obnoxious that its encroachments are not detected until the tree is nearly or quite destroyed, as it does not disturb the outer coat of the bark. By carefully knocking on the body of the tree with the handle of a knife you may ascertain whether the bark is destroyed on the inside, and by stripping it off get at the enemy.

My space will not admit of my pursuing this subject farther. I hope the lovers of good fruit will not omit any opportunity of throwing out useful hints on this branch of our rural pursuits. If there is not enough in the pleasure of eating the fine mellow apple, the sweet juicy peach, the melting pear, the mealy apricot, and the many other delicious fruits completely in our reach to stimulate us to exertion on this subject, let us find that stimulus in the delightful task of imparting it to those who have a proper relish for them, by giving all the light we can upon the subject. Let those who have fine varieties impart the means of raising them to those who have them not. Let us enlist the public feeling on the subject. Let us cultivate a taste for horticulture, and the fruits of our labor will amply repay us. We shall have it in our power to regale our friends on what greatly promotes social feelings, gratifies the palate, and gives health and comfort in a thousand ways.

REVIEW OF THE MEMOIRS OF JOHN FREDERIC OBERLIN, PASTOR OF WALDBACH, IN THE BAN DE LA ROCHE.

For the Farmers' Register.

Heroism is not confined to the high places of the world—it sometimes flourishes in the vale of obscurity. Such was the heroism of Oberlin; and it is satisfactory to turn from "a troubled sea of noise and hoarse disputes," to contemplate the quiet, unsophisticated virtues of the pastor of Waldbach.

This little memoir is one of those books which one can hardly read without being made better by the reading.

Oberlin was born at Strasbourg, 31st of August, 1740, just eight years after the birth of Washington. His early life was not varied by any very remarkable incidents. In the year 1766, he entered on a course of study preparatory to accepting a chaplainship in a French regiment. It was at this time that M. Stouber called at the student's lodging for the purpose of inviting him to accept the vacant curacy of the Ban de la Roche.

M. Stouber found young Oberlin in a little attic up three pair of stairs.

"On opening the door, the first object that caught his attention was a small bed standing in one corner of the room, covered with brown paper hangings. 'That would just suit the Steinthal,' said he to himself. On approaching the bed, he found Oberlin lying upon it, and suffering from a violent tooth-ache. He rallied him about the simplicity of his curtains, and the homeliness of his apartment. 'And, pray,' continued he, after having taken a survey round the room, 'What is the use of that little iron pan that hangs over your table?' 'That is my kitchen,' replied Oberlin: 'I am in the habit of dining at home with my parents every day, and they give me a large piece of bread to bring back in my pocket. At eight o'clock in the evening, I put my bread into that pan, and, having sprinkled it with salt, and poured a little water upon it, I place it over my lamp, and go on with my studies till ten or eleven o'clock, when I generally begin to feel hungry, and relish my self-cooked supper more than the greatest dainties.'

Oberlin accepted the call, and in 1767, at the age of twenty-seven, arrived at Waldbach, a village central to the district of which he came to take charge. And here he passed the remainder of his life, the whole of which was indefatigably devoted to the interests of the people of his cure.

I shall refer chiefly to those passages of his life which come within the scope of an agricultural journal, which serve to display his merits as an improver of the agriculture of his country—as a practical engineer—as a working reformer.

From the following paragraph it will appear that a more inauspicious field for the efforts of benevolence was perhaps not to be found in all France.

"They were alike destitute of the means of mental and social intercourse; they spoke a rude *patois* resembling the Lorrain dialect, and the medium of no external information; they were entirely secluded from the neighboring districts by the want of roads, which, owing to the devastation of war and decays of population, had been so totally lost, that the only mode of communication, from the bulk of the parish to the neighboring towns, was across the river Bruche, a stream thirty feet wide, by stepping stones, and in winter along its bed; the husbandmen were destitute of the most necessary agricultural implements, and had no means of procuring them; the provisions springing from the soil were not sufficient to maintain even a scanty population; and a feudal service, more fatal than sterile land and ungenial climate, constantly depressed and irritated their spirits."

In respect to education, a partial reformation had been effected by M. Stouber, Oberlin's predecessor. How much that reform was demanded, may be judged by the following curious dialogue between Stouber at his arrival, and one of the "old-field" teachers.

"Desiring to be shown the principal school house, he was conducted into a miserable cottage, where a number of children were crowded together without

any occupation, and in so wild and noisy a state that it was with some difficulty he could gain any reply to his inquiries for the master.

"There he is," said one of them, as soon as silence could be obtained, pointing to a withered old man, who lay on a little bed in one corner of the apartment.

"Are you the schoolmaster, my good friend?" inquired Stouber.

"Yes, Sir."

"And what do you teach the children?"

"Nothing, Sir."

"Nothing!—how is that?"

"Because," replied the old man, with characteristic simplicity, "I know nothing myself."

"Why then were you instituted schoolmaster?"

"Why, Sir, I had been taking care of the Waldbach pigs for a great number of years, and when I got too old and infirm for that employment they sent me here to take care of the children."

It remained for Oberlin to renovate education, as he did every thing else—and amidst mountains and sterility, pauperism and rocks, to kindle the rays of knowledge.

Oberlin turned his attention first to the roads, and like Captain Smith at Jamestown, not content with arguments and persuasions, he went to work himself, and aroused the stupid peasants by the magic of example.

"In a country where rocks hanging on the steep declivity of a chain of mountains, and rapid torrents pouring from their summits, are perpetually causing considerable falls of loosened earth, the formation and preservation of roads involves an expense far beyond the resources of a poor and isolated parish; and all the roads belonging to the Ban de la Roche were, consequently, during the greater part of the year absolutely impassable.

To rescue his parishioners from the half savage state in which he found them, he judged it necessary, as a preliminary measure, to bring them into contact with the inhabitants of other districts, further advanced in civilization; and for this purpose to open a regular communication with the high road to Strasbourg, by which means the productions of the Ban de la Roche might find a market, and materials be procured for exercising their industry and ingenuity.

Having, therefore assembled the people, he proposed that they should blast the rocks, and convey a sufficient quantity of enormous masses to construct a wall to support a road, about a mile and a half in length, along the banks of the river Bruche, and build a bridge across it near Rothau.

The peasants were perfectly astonished at the proposition. The project appeared to them totally impracticable, and every one excused himself, on the plea of private business, from engaging in so stupendous an undertaking. Oberlin, still intent on the prosecution of his scheme, endeavored to refute the objections raised on all sides: "The produce of your fields," said he, "will then meet with a ready market abroad; for, instead of being imprisoned in your villages nine months out of the twelve, you will be enabled to keep up an intercourse with the inhabitants of the neighboring districts. You will have the opportunity of procuring a number of things of which you have long stood in need, without the possibility of obtaining them, and your happiness will be augmented and increased by the additional means, thus afforded, of providing comforts for yourselves and your children." But his arguments were concluded with a more touching appeal. He offered them his *own example* in the undertaking. "Let all," said he, "who feel the importance of my proposition, come and work with me."

Oberlin had already traced the plan, and no sooner had he pronounced these words, than, with a pick-axe

on his shoulder, he proceeded to the spot; whilst the astonished peasants, animated by his example, forgot their former excuses, and hastened, with unanimous consent, to fetch their tools and follow him. He presently assigned to each individual an allotted post, selected for himself and a faithful servant the most difficult and dangerous places; and, regardless of the thorns by which his hands were torn, and of the loose stones by which they were occasionally bruised, went to work with the greatest diligence and enthusiasm. The emulation awakened by his conduct quickly spread through the whole parish. The increased number of hands rendered an increased number of implements necessary; he procured them from Strasbourg; expenses accumulated; he interested his distant friends, and, through their assistance, funds were obtained; walls were erected to support the earth, which appeared ready to give way; mountain torrents, which had hitherto inundated the meadows, were diverted into courses, or received into beds sufficient to contain them; perseverance, in short, triumphed over difficulties, and, at the commencement of the year 1770, a communication was opened with Strasbourg, by means of the new road, and a neat wooden bridge thrown across the river. This bridge still bears the name of "*Le Pont de Charite*."

Next he stocked a warehouse in Waldbach with implements of agriculture, and the like necessary articles—established a loan fund, and by sending capable lads to acquire the several trades at Strasbourg, introduced regular bred mechanics, where they had been before unknown. Finally in place of wretched hovels or cabins, he erected cottages, and dug cellars for the preservation of what was then their main sustenance, potatoes.

Above all however, Oberlin strove to improve their mode of agriculture. And here he appealed to their eyes, rather than their ears. Attached to the parsonage house were two gardens, crossed by very public foot paths. In these he set out young fruit trees, and established a nursery. The peasants had to pass through these gardens, in going to their daily work—they could not help observing the contrast between the scanty supply of their own, and the rich produce of their pastor's land. They inquired of him, and he taught them his mode of cultivation.

"The taste for planting trees was thus diffused, and the art of grafting, in which he himself instructed those who wished to understand it, became a favorite employment. The very face of the country, in consequence, underwent a complete change; for the cottages, hitherto for the most part bare and desolate, were surrounded by neat little orchards and gardens; and, in the place of indigence and misery, the villages, and their inhabitants, gradually assumed an air of rural happiness.

So barbarous before Oberlin's time had been the state of the Ban de la Roche, with regard to the most simple agricultural arts, that the old men told him they remembered to have heard from their fathers, that previous to the year 1709, the people of this canton subsisted chiefly upon wild apples and pears. The dreadful famine that took place that year, compelled them to devise means for procuring some other sustenance; and, with this view, they partially cleared away an immense forest, which extended nearly all over the country, and planted a sort of potatoes, (*quemottes*, or *cruettes de terre* in the *patois*;) which were then first introduced. Owing to the rigorous seasons, and to the soil having been often swept away from the rocks it covered by the rain, this primitive potato had so far degenerated, that, when Oberlin came to the Ban de la Roche, in 1767, fields that had formerly yielded from 120 to 150 bushels, furnished only be-

tween 30 and 50. The people imagined that the ground was in fault, but no means of remedying the evil ever occurred to them. Oberlin, attributing the circumstance to its true cause, pointed out to them the means of recovering the crops, made them acquainted with Parmentier's useful work on the subject, and procured some seed from Switzerland, Holland and Lorraine, to renew the species. The sandy soil of the mountains being peculiarly favorable to their vegetation, abundance soon returned; and potatoes of a superior quality and flavor, soon became, and are to this day, celebrated as the great production of the place, furnishing not only a sufficient store for home consumption, but also a profitable article of exportation.

Believing that great advantages would accrue from the cultivation of leguminous plants and productive herbs, before unknown in that part of the country, Oberlin's next attempt was to raise saint-foin; but, as this plant strikes its root perpendicularly, and the soil of the Ban de la Roche is not deeper than two feet at most on the rocks and sandstone, it did not succeed, though the flax, which he raised from seed imported from Riga, and the Dutch clover, which he also introduced, answered perfectly well, and considerably augmented the resources of the inhabitants.

This success was probably owing in part to the attention he paid to the management of manure, which constitutes a chief secret in agriculture. He not only directed his laborers to the means of enriching it by fermentation, but taught them also that all sorts of vegetable substances, even the leaves of trees, the stalks of rushes, moss and fir apples, might be converted into a useful compost. Acting upon his favorite maxim, "*gather up the fragments, that nothing be lost,*" he also instructed children to tear old woollen rags into pieces, and to cut up old shoes for this purpose; and to facilitate their labors, he paid them sixteen sous for a bushel, and one sou for the smallest quantity they liked to collect."

Oberlin taught his parishioners to convert their unproductive pastures into arable land, and feed their cattle in stalls.

"This conversion of grass into arable land, in a country where rocks were piled upon rocks, and where in some places large masses must be blasted, and in others removed and covered with good soil, before the plough could possibly be employed, required of course a great deal of time and labor; but the industry and zeal with which Oberlin himself began to put in practice every scheme that successively occurred to him, had such an influence upon the minds of his parishioners, that, after the prejudices of the few first years had entirely subsided, they seldom failed to enter into his views, and to imitate his example: the plan was tried, and answered his most sanguine expectations.

In the year 1778, he formed, at the Bande la Roche, a little Agricultural Society, composed of the more intelligent farmers and the best informed inhabitants of his parish; and, having invited the pastors of the adjacent towns and some of his friends to become members, he connected it with that of Strasbourg, in order to secure the communication of periodical works, and assistance in the distribution of prizes; and the latter Society, wishing to encourage its interesting auxiliary, entrusted to its disposal the sum of two hundred francs, to be distributed among such peasants as should most distinguish themselves in the planting of nursery grounds and in the grafting of fruit trees.

The good effects resulting from this measure induced Oberlin likewise to form a fund, supported by voluntary contributions, for the distribution of prizes to the farmers of each commune, who should rear the finest ox. A short time afterwards, with a view to prepare the rising generation for continuing the works which their fathers had begun, and to give the opportunity of acquiring useful information, he commenced the plan of

devoting two hours every other Thursday morning to a familiar lecture on the subjects of agriculture and of useful science.

Such, indeed, was his assiduity, that not a year rolled away in which some astonishing improvement was not effected in the condition or the morals of his people; and the surrounding districts beheld with admiration the rapid progress that civilization was continually making, in the once neglected and apparently forsaken Steinthal."

Oberlin established in the Ban de la Roche, an admirable system of education. He in those sequestered mountains was the first to adopt the famous Infant Schools. In each of five villages he founded public schools; and once a week he in person examined and taught all the children collected together. He established a circulating library, and awarded prizes to masters and scholars. He drew up an almanac, divested of astrological stuff, and adapted to the wants of his people. Among other things he taught them botany, and explained to them the uses of their native plants. After he had lived in the Ban de la Roche thirty years, we have in a letter written by an English visiter, the following sketch of the patriarchal curate, and his house.

"The following morning we set off to return the visit which he had paid us on the preceding day. We found the worthy pastor in his morning gown; it was plain, but whole and clean. He was just on the point of concluding a lecture; his pupils had, like their master, something soft, indeed almost heavenly, in their look.

"The house stands well, and has, from the garden side, a romantic view; in every part of it that kind of elegance, which is the result of order and cleanliness, prevails. The furniture is simple; yet it suggests to you that you are in the residence of no ordinary man; the walls are covered with maps, drawings, and vignettes, and texts of Scripture are written over all the doors.

His study is a peculiar room, and contains rather a well chosen, than numerous, selection of books in French and German, chiefly for youth. The walls are covered with engravings, portraits of eminent characters, plates of insects and animals, and colored drawings of minerals and precious stones; it is, in short, literally papered with useful pictures relative to natural history and other interesting subjects."

"I am writing this at his table, whilst he is busy preparing leather gloves for his peasant children. His family are around him, engaged in their different avocations; his eldest son, Frederic, is giving a lesson to some of the little ones, in which amusement and instruction are judiciously blended; and the dear father, without desisting from his employment, frequently puts in a word. He took me this morning into his workshop, where there is a turner's lathe, a press, a complete set of carpenter's tools, also a printing-press, and one for book-binding. I assisted him in coloring a quire of paper, which is intended for covers of school-books. He gives scarcely any thing to his people but what has been, in some measure, prepared by his own or his children's hands.

"He will never leave this place. A much better living was once offered to him. 'No,' said he, 'I have been ten years learning every head in my parish, and obtaining an inventory of their moral, intellectual and domestic wants; I have laid my plan. I must have ten years to carry it into execution, and the ten following to correct their faults and vices.'

"Pastor Oberlin is too modest and generous not to bear testimony to the worth of his predecessor, who had begun to clear this wilderness, and to raise the superstructure, which he has so beautifully completed.

"Yesterday, I found him encircled by four or five families who had been burnt out of their houses; he was dividing amongst them articles of clothing, meat, money, books, knives, thimbles, and colored pictures for the children, whom he placed in a row according to their ages, and then left them to take what they preferred."

M. le Comte Francois de Neufchâteau on proposing a gold medal to Oberlin for services rendered during more than half a century, to agriculture in particular, and mankind in general, thus addresses himself to the Royal and Central Agricultural Society of Paris.

"If you would behold an instance of what may be effected in any country for the advancement of agriculture and the interests of humanity," said he, when addressing the Society upon this occasion, "quit for a moment the banks of the Seine, and ascend one of the steepest summits of the Vosges mountains. Friends of the plough, and of human happiness, come and behold the Ban de la Roche! Climb with me the rocks so sublimely piled upon each other, which separate this canton from the rest of the world, and though the country and the climate may at first sight appear forbidding, I will venture to promise you an ample recompense for the fatigue of your excursion."

"As for myself, after having formed the administration of the department of the Vosges, in 1790, and presided over it, in 1791, I had, in 1793, to travel over those mountains as a commissioner of the government, at the very period when the parishes of Rothau and Waldbach, before that time dependant on the principality of Salm, were united to the department. I have, therefore, been long acquainted with the valuable services rendered, for more than fifty years, to the Ban de la Roche, by John Frederic Oberlin. Ever since that time, and to the advanced age of seventy-eight, he has persevered in carrying forward the interesting reformation first suggested and commenced by his virtue, piety and zeal. He has refused invitations to more important and more lucrative situations, lest the Ban de la Roche should relapse into its former desolate state; and by his extraordinary efforts and unabated exertions, he averted from his parishioners, in the years 1812, 1816, and 1817, the horrors of approaching famine."

"Such a benefactor of mankind deserves the veneration and the gratitude of all good men; and it gives me peculiar pleasure to present you with the opportunity of acknowledging, in the person of M. Oberlin, not a single act, but a whole life, devoted to agricultural improvements, and to the diffusion of useful knowledge amongst the inhabitants of a wild and uncultivated district."

"We have already ascertained that there is in France uncultivated land sufficient for the formation of five thousand villages. When we wish to organize these colonies, Waldbach will present a perfect model; and, in the thirty or forty rural hamlets which already exist, there is not one, even amongst the most flourishing, in which social economy is carried to a higher degree of perfection, or in which the annals of the Ban de la Roche may not be studied with advantage."

* The new crop of potatoes that Oberlin had introduced, formed the principal subsistence of the people during those disastrous years, when the season was so cold and rainy that they could not get in two-thirds of the corn at all; and the scarcity so great, that poor little children, exhausted with hunger, were seen to drop down in the streets. A sack of wheat during that time of distress rose to 145 francs, and the potatoes to nearly one sou apiece.

The precise acquaintance which the inhabitants of the Ban de la Roche had acquired, through Oberlin's assistance, with the vegetable productions of their canton, was believed to be the means of preventing the most distressing diseases.

Perhaps in closing this little book some ingenuous but romantic reader may sigh for another Ban de la Roche, where, nestled among mountains, he might aspire to the obscure heroism of the curate of Waldbach. It may be that in Virginia there are none who live upon wild apples, or speak a vile patois; yet if defects, disadvantages, and drawbacks be *desiderata*, on this score perhaps, in some parts of this state, there will be found small ground for complaint. To diminish the sources of human ill-being, and multiply the sources of human well-being, is a field, every where, without limit: and if there were only an Oberlin in each county—in each parish in Virginia, how soon she would start like magic out of the ashes of her present decay!

Oberlin seems to have formed his plans by somewhat of a military *coup d'œil*. He had a firm confidence in himself—a strong decision of character. He had an untiring industry and patience of detail. He understood the maxim, that small causes produce grand effects. He was a man of minutiae and particulars. He knew that "many a little makes a mickle"—that masses are made up of mites.

While Oberlin was carrying into execution this beautiful system of improvements, France became the theatre of revolution, and the most sanguinary anarchy. But the fury of civil war never reached the peaceful secluded district of the Ban de la Roche. Encircled by mountains and the guardianship of Oberlin, the people of the Steinthal escaped unhurt amid the billows of national turmoil.

In our own country is it not to be lamented, that our ears are so often saluted with the din of politics? Does the happiness of the people depend on every wind and hollow blast that issues from the the Æolian cave? Is there nothing worthy of human concern but politicians and politics?

"In every government though terrors reign,
Though tyrant kings, or tyrant laws restrain,
How small, of all that human hearts endure,
That part which kings or laws can cause or cure!
Still to ourselves in every place consigned,
Our own felicity we make or find.
With secret course that no loud storms annoy,
Glides the smooth current of domestic joy."

A Vasa may free his country—a Washington make his country independent—but it takes an Oberlin to make his country happy.

It was Oberlin's fortune to be a cotemporary of Napoleon. Napoleon published his warlike bulletins from the field of battle, and dated his imperial decrees at the palaces of dethroned monarchs and the capitals of subjugated kingdoms.

Oberlin issued his little circulars from the parsonage at Waldbach, to the villagers, directing them when and how to set out, and trim their fruit trees.

Napoleon's rewards were sceptres and crowns—triumphal arches—the roar of artillery, and the acclamations of the multitude.

Oberlin's reward was smiles and tears of gratitude from those whose happiness was his.

Napoleon amid the pomp and magnificence of the Tuilleries was restless and disturbed—his heart rent with the fury of contending passions.

Oberlin in the parsonage was heard to say—"Yes, I am happy."

The one died on a volcanic rock in the ocean—

lonely and desolate—far from the scenes of his glory and his power, descending to his grave amid lurid clouds—followed by the admiration and curses of mankind. Oberlin's death was a quiet sunset—the hushed serenity of closing day. He was followed by the tears of his parishioners—lamenting in inconsolable bitterness, the irreparable loss of their curate—their guide—their father—weeping for Oberlin.

“During the four days that intervened between his decease, and the simple and affecting ceremony which consigned his remains to their last home, heavy clouds rested on the surrounding mountains, and the rain poured down in incessant torrents; this circumstance did not, however, prevent the inhabitants of the Ban de la Roche, of all ages and conditions, nearer or more remote, from coming to pay a last tribute of respect to the remains of their “dear father,” whose venerable countenance they were permitted to see through a glass lid, which, under the direction of Mr. Legrand, covered the coffin, which was placed in his study.

Early in the morning of the day fixed on for the interment, the clouds cleared away, and the sun shone with its wonted brilliancy. As they left the house, the president of the Consistory of Barr, the Rev. Mr. Jaeglé, placed the clerical robes of the late pastor on his coffin, the vice-president placed his Bible upon it, and the mayor affixed to the funeral pall the decoration of the Legion of Honor. At the conclusion of this ceremony, ten or twelve young females, who had been standing around the bier, began to sing a hymn in chorus, and at two o'clock the procession took its departure, the coffin being borne by the mayors, elders, and official magistrates. In front of it, walked the oldest inhabitant of the Ban de la Roche, carrying a cross, which Louise had given him, to plant on the tomb, and on which the words, *Papa Oberlin*, were engraved in open letters.

So numerous was the concourse of people assembled on the occasion, that the foremost of the train had already reached the church of Foudai, where the interment was to take place, before the last had left the parsonage, although the distance was nearly two miles. The children of the different schools formed part of the melancholy procession, chanting, at intervals, sacred hymns, selected and adapted for the occasion. At the moment of their approaching the village, a new bell, presented by Mr. Legrand in commemoration of this day of general mourning, was heard to toll for the first time, and to mingle its melancholy sound with that of all the bells in the valley. The burying ground was surrounded by Roman Catholic women, all dressed in mourning, and kneeling in silent prayer. On arriving at the church, the coffin was placed at the foot of the altar, and as many persons entered as the little edifice would contain, though more than three-fourths of the company had to remain in the churchyard, and the adjoining lanes. Notwithstanding the pressure of so immense a multitude, the utmost order and solemnity prevailed. Several females, who could find room no where else, sat down on the steps of the altar, leaning with melancholy affection against the coffin, as though anxious to cling to the very ashes of one whom they had so much revered and loved. Many distinguished individuals were present on the occasion and several Roman Catholic priests, dressed in their canonicals, took their seats among the members of the Consistory, and evidently participated in the general grief.

The most touching incident in this extract, and that which speaks most loudly for the purity of his religion and virtue, is the fact that the protestant pastor Oberlin's burial was attended by Catholic priests and their parishioners, all sharing the profound grief of his own flock, and evincing the same

reverence for the true christian, whose grave they surrounded. Thus to conquer (in himself as well as in other persons) religious bigotry and sectarian intolerance and hatred, was perhaps, the greatest and most difficult of all his noble works, and which would alone serve as the highest eulogy on his life, and the most unquestionable proof of his exalted, yet meek and humble virtues.

RICHMOND, FREDERICKSBURG AND POTOMAC RAILWAY.

From the Richmond Compiler.

The surveys which have been made for the route of this railway, ascertain that the distance between Richmond and Fredericksburg by a direct line from the boundary of one corporation to that of the other, is about 51 miles; and that a good route can be obtained for the railway with an increase of distance of not more than 8 miles. Indeed there are two routes open for the choice of the Company; one surveyed last winter passing over the Pamunkey below the junction of the North and South Anna, and also passing by the Bowling Green; the other, more recently surveyed, crossing the branches of the Pamunkey and passing west of the Bowling Green. On each of these routes, the owners of lands are generally willing to allow the rail road to be conducted through them without any charge for the land, or any claim for damages. On each there is sufficient supply of timber and the distance between the two is not very great. By the Bowling Green route it is 59 miles, and by the other 57½ miles. Some further examinations will be requisite to ascertain the relative expenses.

Until the examinations are completed, the Board of Directors will be unable to determine upon the course the road should take from the Pamunkey to Fredericksburg. As to the course from Richmond to the Pamunkey, there was no difficulty in deciding. A line has been fixed upon, which will be equally proper whether one route or the other be taken beyond the Pamunkey. Passing within three and a half miles of the coal mines, in the upper part of Henrico, the Company will be enabled to make a branch from their road to the mines, and thus bring to market a large supply of coal. By this the citizens of Fredericksburg as well as those of Richmond, will be essentially benefited.

From the spirit in which this enterprise is conducted the happiest results may be anticipated. Already the Board have directed the Engineer to put under contract, in December, the whole line from Richmond to the Pamunkey. And in fourteen months this portion of the road will probably be in use. In conclusion, it may be remarked, that every thing thus far tends to show that the quantity of produce, and articles to be transported upon the road, will be much greater than was originally supposed. Our city will derive from the work much more benefit than is generally believed.

A PROLIFIC COW.

A rather remarkable zoological phenomenon occurred upon Tuesday morning last, at the village of Redding. A cow, belonging to a woman there, produced no less than *four* calves, (three queys and a bull,) which, with the mother, are doing well.—*Stirling Journal*, 1834.

DISEASES OF THE INTESTINES OF HORSES.

From the Library of Useful Knowledge—Farmer's Series.

These form a very important part of horse surgery, and many erroneous notions are prevalent respecting them. The first disease we will consider is

Spasmodic Colic.

We have said, that the passage of the food through the intestinal canal is effected by the alternate contraction and relaxation of the muscular coat of the intestines. When that action is simply increased through the whole of the canal, the food passes more rapidly, and purging is produced; but the muscles of every part of the frame are liable to irregular and spasmodic action, and the muscular coat of some portion of the intestines may be thus affected. A species of cramp may attack a portion of the intestines. The spasm may be confined to a very small part of the canal. The gut has been found, after death, strangely contracted in various places, contraction not extending above five or six inches in any of them. In the horse, the ileum is the usual seat of this disease. It is of much importance to distinguish between spasmodic colic and inflammation of the bowels, for the symptoms have considerable resemblance, although the mode of treatment should be very different.

The attack of colic is usually very sudden. There is often not the slightest warning. The horse begins to shift his posture, look round at his flanks, paw violently, strike his belly with his feet, lie down, roll, and that frequently on his back. In a few minutes the pain seems to cease, the horse shakes himself, and begins to feed; and, on a sudden, the spasm returns more violently, every indication of pain is increased, he heaves at the flanks, breaks out into a profuse perspiration, and throws himself more violently about. In the space of an hour or two, either the spasms begin to relax, and the remissions are of longer duration, or the torture is augmented at every paroxysm, the intervals of ease are fewer and less marked, and inflammation and death supervene.

Of the symptoms by which it may best be distinguished from inflammation of the bowels, we shall speak when we treat of that disease. Among the causes of colic are, the drinking of cold water when the horse is heated. There is not a surer cause of violent spasm than this. Colic will sometimes follow the exposure of a horse to the cold air, or a cold wind after violent exercise. Green meat, although, generally speaking, most beneficial to the horse, yet given in too large a quantity, or when the horse is hot, will frequently produce gripes. In some horses there seems to be a constitutional predisposition to colic. They cannot be hardly worked, or exposed to unusual cold, without a fit of it. In many cases, when these horses have died, stones have been found in some part of the alimentary canal.

Fortunately, we are acquainted with several medicines that allay these spasms; and the disease often ceases almost as suddenly as it appeared. Turpentine is one of the most powerful remedies, especially if given in union with opium. Three ounces of spirit or oil of turpentine, with an ounce of laudanum, given in a pint of warm ale, will frequently have an almost instantaneous effect. Even

a small quantity of fluid will seldom be detained in the stomach, but will pass through the ileum to the cæcum or water-stomach, and in this passage will come in immediate contact with the spasmed part.

If relief be not obtained in half an hour it will be prudent to bleed, because the continuance of violent spasm will produce inflammation. Some practitioners bleed at first, and it is far from bad practice; for although the majority of cases will yield to turpentine, opium, and aloes, an early bleeding may occasionally prevent the occurrence of inflammation, or at least mitigate it. If it be clearly a case of colic, half of the first dose may be repeated, with a full ounce of Barbadoes aloes dissolved in warm water. The stimulus produced on the inner surface of the bowels by the purgative may counteract the irritation which caused the spasm. The belly should be well rubbed with a brush or warmed cloth, but not bruised and injured by the broom-handle rubbed over the belly by two great fellows with all their strength. The horse should be walked about, or trotted moderately. The motion thus produced in the bowels, and the friction of one intestine over the other, may relax the spasm, but the hasty gallop may speedily cause inflammation to succeed to colic. Clysters of warm water, or containing a solution of aloes, will be injected. The patent syringe will here be most useful.

When relief has been obtained, the clothing of the horse, saturated with perspiration, should be removed, and fresh, dry clothing substituted. He should be well littered down in a warm stable or box, and have bran mash for the two or three next days, and drink only lukewarm water.

Some persons give gin, and even gin and pepper, in cases of gripes. This, however, is a practice to which we strongly object; it may be useful, or even sufficient, in ordinary cases of colic, but if there be any inflammation or tendency to inflammation, it cannot fail to be highly injurious.

Calculi, or stones in the intestines.

We have mentioned these as a cause of colic in horses that are subject to frequent attacks of it. Some indigestible substance lodges in the cæcum or colon: earthy, or half-digested vegetable matter gradually accumulates around this, and a ball, weighing many pounds, is sometimes formed. This will produce colic, or obstruct the passage of the gut, or, by its pressure, produce inflammation; but as there are few or no symptoms by which the presence of these stones is clearly indicated, and few, or rather, no certain means, by which they may be removed, we will pass on to an occasional consequence of colic.

Intususception of the intestines.

The spasmodic action of the ileum long continued, may be succeeded by an inverted action from the cæcum towards the stomach, more powerful than the natural action; and the contracted portion of the intestine is thus forced into a portion above it that retains its natural calibre; and the irritation caused by this increases the action, until more is forced in, and an obstruction is formed which no power can overcome. Even the natural motion of the bowels will be sufficient to produce intususception, when the contraction of a portion of the ileum is very great. There are no symp-

toms to indicate the presence of this, except continued and increasing pain; or if there were, all our means of relief would here fail.

Entanglement of the bowels.

This is another and more singular consequence of colic. Although the ileum is enveloped in the mesentery, and its motion to a considerable degree confined, yet under the spasm of colic, and during the violence with which the animal rolls and throws himself about, portions of the ileum become so entangled as to be twisted into nooses and knots, drawn together with a degree of tightness scarcely credible. Nothing but the extreme and lengthened torture of the animal can lead us to suspect that this has taken place, and, could we ascertain its existence, there would be no cure.

Inflammation of the bowels.

There are two varieties of this malady. The first is inflammation of the external coats of the intestines, accompanied by considerable fever and costiveness. The second is that of the internal or mucous coat, usually the consequence of an overdose of physic, and accompanied by violent purging. We will here speak of the first of these affections. It has been divided into inflammation of the peritoneal coat, and that of the muscular: but the causes, symptoms, and treatment of both are so much alike, that it would be raising unnecessary difficulties to endeavor to distinguish between them. Inflammation of the external coats of the stomach, whether the peritoneal or muscular, or both, is a very frequent and fatal disease. It speedily runs its course, and it is of great consequence that its early symptoms should be known. If the horse has been carefully observed, restlessness and fever will have been seen to precede the attack; in many cases a direct shivering fit will be observed; the mouth will be hot, and the nose red. The horse will soon express the most dreadful pain by pawing, striking at his belly, looking wildly at his flanks, groaning and rolling. The pulse will be quickened and small; the ears and legs cold; the belly tender and sometimes hot; the breathing quickened; the bowels costive; and the horse becoming rapidly and fearfully weak.

It may be useful to give a short table of the distinguishing symptoms of colic and inflammation of the bowels, because the treatment recommended for the former would often be fatal in the latter.

Colic.

Sudden in its attack.

Pulse rarely much quickened in the early period of the disease, and during the intervals of ease: but evidently fuller.

Legs and ears of the natural temperature.

Relief obtained from rubbing the belly.

Relief obtained from motion.

Intervals of rest.

Strength scarcely affected.

Inflammation of the bowels.

Gradual in its approach, with previous indications of fever.

Pulse very much quickened, but small, and often scarcely to be felt.

Legs and ears cold.

Belly exceedingly tender and painful to the touch.

Motion evidently increasing the pain.

Constant pain.

Rapid and great weakness.

The causes of this disease are, first of all, and most frequently, sudden exposure to cold. If a horse that has been highly fed, carefully groomed, and kept in a warm stable, be heated with exercise, and have been for some hours without food; and in this state of exhaustion be suffered to drink freely of cold water, or be drenched with rain, or have his legs and belly washed with cold water, an attack of inflammation of the bowels will often follow. An overfed horse subjected to severe and long continued exertion, if his lungs were previously weak, will probably be attacked by inflammation of them; but if the lungs were sound, the bowels will on the following day be the seat of disease. Stones in the intestines are an occasional cause of inflammation, and colic neglected, or wrongly treated, will terminate in it.

The treatment of inflammation of the bowels, like that of the lungs, should be prompt and energetic. The first and most powerful means of cure will be bleeding. From six to eight or ten quarts of blood should be taken as soon as possible, and the bleeding repeated to the extent of four or five quarts more if the pain be not relieved, and the pulse have not become rounder and fuller. The speedy weakness that accompanies this disease should not deter from bleeding largely. It is the weakness that is the consequence of violent inflammation of these parts, and if that inflammation be subdued by the loss of blood, the weakness will disappear. The bleeding should be effected on the first appearance of the disease, for there is no malady that so quickly runs its course.

Next to bleeding will follow clysters. Although the bowels are usually confined, we cannot administer a strong purgative; the intestines are already in far too irritable a state. The clyster may consist of warm water, or very thin gruel, in which half a pound of Epsom salts, or half an ounce of aloes has been dissolved, and too much fluid can scarcely be thrown up. If the common ox-bladder and pipe be used, it should be frequently replenished: but with Reed's patent pump, already referred to, sufficient may be injected to penetrate beyond the rectum, and reach to the colon and cæcum, and dispose them to evacuate their contents. The horse may likewise be encouraged to drink plentifully of warm water or thin gruel; and draughts, each containing a couple of drachms of dissolved aloes, may be given every six hours, until the bowels are freely opened.

Next, it will be prudent to endeavor to excite considerable external inflammation, as near as possible to the seat of internal disease, and therefore the whole of the belly should be blistered. In a well-marked case of this inflammation, no time should be lost in applying fomentations, but the

* The human practitioner gives, under this disease, and with advantage, very powerful doses of purgative medicine; and he may be disposed to demur to the cautious mode of proceeding we recommend with regard to the horse. Although we may not be able to give him a satisfactory theoretical reason in defence of our treatment, we can appeal to the experience of every veterinary surgeon, that a strong dose of physic given in inflammation of the bowels would be certain poison.

blister be at once resorted to. The tincture of Spanish flies, whether made with spirit of wine or turpentine, should be well rubbed in. The legs should be well bandaged, to restore the circulation to them, and thus lessen the flow of blood to the inflamed part, and for the same reason the horse should be warmly clothed, but the air of the stable or box should be cool.

No corn or hay should be given during the disease, but bran-mashes, and green meat if it can be procured. The latter will be the best of all food, and may be given without the slightest apprehension of danger. When the horse begins to recover, he may get a handful of corn two or three times in the day, and, if the weather be warm, may be turned into a paddock for a few hours in the middle of the day. Clysters of gruel should be continued for three or four days after the inflammation is beginning to subside, and good hand-rubbing applied to the legs.

The second variety of inflammation of the bowels affects the internal or mucous coat, and is generally the consequence of physic given in too great quantity, or of an improper kind. The purging is more violent, and continues longer than was intended; the animal shows that he is suffering great pain; he frequently looks round at his flanks; his breathing is laborious, and the pulse is quick and small; not so small, however, as in inflammation of the peritoneal coat, and, contrary to some of the most frequent and characteristic symptoms of that disease, the mouth is hot, and the legs and ears are warm. Unless the purging is excessive, and the pain and distress great, we should hesitate at administering any astringent medicine at first. We should plentifully administer gruel, or thin starch, or arrow-root, by the mouth and by clyster, removing all hay and corn, and particularly green meat. We should endeavor thus to sheath the irritated surface of the bowels, while we permitted any remains of the medicine to be carried off. If, however, twelve hours should pass, and the purging and the pain remain undiminished, we should continue the gruel, but add to it chalk, catechu, and opium, in doses of an ounce of the first, a quarter of an ounce of the second, and two scruples of the last, repeated every six hours. As soon as the purging begins to subside, the astringent medicine should be lessened in quantity, and gradually discontinued. Bleeding will rarely be necessary unless the inflammation be very great, and attended by symptoms of general fever. The horse should be warmly clothed, and placed in a warm stable, and his legs should be hand-rubbed and bandaged.

Violent purging, and attended with much inflammation and fever, will sometimes occur from other causes. Green meat will sometimes purge. A horse worked hard upon green meat will scour. The remedy is change of diet, or less labor. Young horses will scour, and sometimes without any apparent cause. Astringents should be used with much caution here. It is probably an effort of nature to get rid of something that offends. A few doses of gruel will assist in effecting this purpose, and the purging will cease without astringent medicine.

Some horses that are not well-ribbed home, (having too great space between the last rib and the hip-bone,) are subject to purging if more than usual exertion is required from them. They are

recognised by the term of *washy* horses. They are often free and fleet, but destitute of continuance. They should have rather more than the usual allowance of corn, with beans, when at work, and a cordial ball, with one drachm of catechu, and ten grains of opium will often be serviceable either before or after a journey.

Worms.

Worms of different kinds inhabit the intestines; but except when they exist in very great numbers, they are not so hurtful as is generally supposed, although the groom or carter may trace to them hidebound, and cough, and loss of appetite, and gripes, and megrims, and a variety of other ailments. Of the origin or mode of propagation of these parasitical animals we will say nothing; neither writers on medicine, nor even on natural history, have given us any satisfactory account of the matter.

The long white worm (*lumbricus teres*) much resembling the common earth-worm, and, being from six to ten inches long, inhabits the small intestines. It is a formidable looking animal, and if there are many of them they may consume more than can be spared of the nutritive part of the food or the mucus of the bowels; and we think that we have seen a tight skin, and rough coat, and tucked up belly, connected with their presence. They have then, however, been voided in large quantities, and when they are not thus voided we should be disposed to trace these appearances to other causes. A dose of physic will sometimes bring away almost incredible quantities of them. Calomel is frequently given as a vermifuge. The seldomer this drug is administered to the horse the better. It is the principal ingredient in some quack medicines for the expulsion of worms in the human subject, and thence, perhaps, it came to be used for the horse; but in him we believe it to be inert as a vermifuge, or only useful as quickening the operation of the aloes. When the horse can be spared, a strong dose of physic is an excellent vermifuge, so far as the long round worm is concerned; but perhaps a better medicine, and not interfering with either the feeding or work of the horse, is two drachms of emetic tartar, with a scruple of ginger, made into a ball, with linseed meal and treacle, and given every morning half an hour before the horse is fed.

A smaller, darker colored worm, called the needle worm, or *ascaris*, inhabits the large intestines. Hundreds of them sometimes descend into the rectum, and immense quantities have been found in the cæcum. These are a more serious nuisance than the former, for they cause a very troublesome irritation about the fundament, which sometimes sadly annoys the horse. Their existence can generally be discovered, by a small portion of mucus, which hardening, is converted into a powder, and is found about the anus. Physic will sometimes bring away great numbers of these worms, but when there is much irritation about the tail, and much of this mucus indicating that they have descended into the rectum, an injection of a quart of linseed oil, or of an ounce of aloes dissolved in warm water, will be a more effectual remedy.

The tape worm is seldom found in the horse.

DESULTORY OBSERVATIONS ON THE CONDITION OF AGRICULTURE IN VIRGINIA, AND THE MEANS FOR ITS IMPROVEMENT.

To the Editor of the Farmers' Register.

I have not the pleasure of a personal acquaintance with yourself, but am a subscriber to the "Farmers' Register," and hope that, while the enclosed amount for my arrearages is forwarded, you will not consider the few observations that accompany it, as expressive of the interest which I feel in your undertaking and efforts as the editor of that invaluable periodical, as inexcusably obtrusive. There is no debt, I assure you, which I pay with more cheerfulness, and none of my pecuniary expenditures are made under a fuller belief of receiving an ample and almost immediate equivalent than those which are incurred in the expense of procuring the able agricultural journal which you have the honor of presenting to the public. My object is not to offer adulation, but to afford you, if you will accept it, my humble *mite* of encouragement in the laudable enterprise (as I conceive it to be) in which you have embarked. Yours, if I mistake not, is the first publication of the kind in our country, which has excited any considerable degree of attention south of the Potomac, and has appeared to me, from its commencement, to be sustained with an ability not exceeded by any similar publication to which I have had access, (and I have seen several,) that has issued from any direction, or originated in any quarter of the world. My profession is not a secular, but a sacred one, and while consistency and conviction both constrain me to *magnify my office*, and to claim for it, in its bearings on the happiness of the human race, the superiority over all other occupations which engage the attention of men, truth and candor at the same time oblige me to acknowledge that, *in the peculiar circumstances of this country at present*, the individual, who shall fill with respectability the station which you occupy, has the power, in my humble judgment, to exert a more salutary and extensively lasting and beneficial influence, than any other that can be mentioned, whether his employment be that of a literary teacher, or statesman, or lawyer, or physician, or preacher. Agriculture lays at the foundation of every thing useful, or comfortable, or desirable in human life. No nation or people can be permanently prosperous or thriving, whose agricultural interests are neglected. *The profits of the earth are for all, and the king himself is served of the field.* The professional characters to which I have alluded, can have no opportunity or scope for exertion on a large scale, in a country that is not an agricultural one, and for the plain and sufficient reason, that none but an agricultural country can ever become very populous. A sparse population is the necessary result of ignorance, inexperience, and indifference in the business of agriculture; and to suppose that professional men can find useful and profitable employment in a country of but few inhabitants, would be as unreasonable as to expect that animals will fatten on a meagre subsistence. I am pleased that, in connexion with others, you have succeeded in establishing some highly important truths which were formerly either not known, or entirely discredited, (it is lamentable that many should still be so slow to embrace them,) but which are now received by the

more intelligent among the cultivators of the soil, as *agricultural axioms*, about which all doubt and discussion may cease; *axioms* that may be expressed in few words, and on the correctness of which any one, who chooses, may immediately and safely proceed to act. A few of these are—

That deep ploughing never need be dreaded.

A small farm well conducted is a source of greater revenue, than a large one indifferently managed.

It would be a vast amount of saving to the whole community, if every private owner were required to keep his stock from committing depredations on his neighbors, instead of imposing this onerous burden upon them.

The profits of agriculture (other things being equal) are in proportion to the attention paid to manuring; that is, as is the extent of the latter, so will be that of the former.

The corn crop, with the stalk cut up from the ground entire, at a much earlier period than has usually been practised, is worth almost double what it is when gathered in the old way.

Prepared food of some kinds, and for some animals, will go nearly, if not quite, twice as far as that which is given in a raw and natural state.

The raising of tobacco need not impoverish the land, but it is only to the undue and disproportionate space that is allotted to this staple commodity that the mischief it is said to have produced, is attributable.

Other points of a similar nature, and of like importance, might be mentioned, but these may suffice as specimens. If I had time, I should regard it as a pleasing amusement to collect from your own, and other agricultural papers, a sheet or two of such short sententious sayings, which, when put together, I would style "The Farmer's practical Compend and Guide," which would serve as a manual to spread out before him, within a narrow compass, the results of agricultural experience and wisdom.

I have also been much gratified with the resolution you have manifested to grapple with prejudices of extensive prevalence and long standing, which oppose their obstructing force to the improvements you would introduce, and which seem, with some, to abide with a fixedness almost as firm as "the Ridge of Blue" on our west. But time must melt even *these*, if not *that* away. May yours be the honor and the achievement first to start them into motion that will be kept up till they shall be driven to "a returnless distance" from the "Old Dominion." To whatever other cause the low state of agriculture that is complained of in Virginia may be referred, it is certain to my mind, that it cannot, with the least shadow of propriety, be attributed to a deficiency in natural advantages. In these respects, as in the extent of her territory, she surpasses her proud sister, the State of New York. Her soil is as good, if not better—her water and land privileges for internal improvements, *on the whole* about equal—her timber more valuable—her mines, as far as yet explored, more numerous and rich, and her climate, beyond all question, vastly superior. But still it must be admitted that she now falls behind in almost every thing that constitutes the wealth and strength of a commonwealth. An adequate cause for an effect so obvious, and so extensively experienced, must somewhere exist, and may be

assigned. Without attempting to account for it altogether from the fact that slavery here exists, which, perhaps, would be taking a position that many would be disposed to controvert, it appears to me, that some other things may be mentioned, which are evils that more easily admit of correction, that are extremely injurious in their operation, and the removal of which should forthwith enlist the exertions of all who have influence, and who love "the land of their birth." Owing to existing institutions, and to the influence of immemorial custom in Virginia, it has happened, that nearly every thing relating to the cultivation of the soil, as mode, implements, &c. has been committed to the hands of slaves, or to white men whose ingenuity and knowledge, (might it not without impropriety be said, whose ignorance and unskilfulness, as a class?) gave to them qualifications for their employment scarcely superior to those of the untutored negroes. The consequence is, that the *intellect* of this country has never been brought to bear on the interesting subject of agriculture. It has been diverted into other channels. Virginia has had her orators, and her professional men of eminence, but few of them have thought it worth their while to employ their intellectual energies on "the first and finest" earthly occupation of man; an occupation which opens a range most delightful, and of sufficient dimensions, to call into exercise the resources of the most expanded mind. If you, sir, can have success with your fellow citizens in directing *mind* and *thought* to the subject of agriculture in this State, it will flourish, and you will do much, perhaps more than any other man for its ultimate prosperity and happiness. Would it not be advisable, (you will excuse me for the liberty I take in making the suggestion,) to endeavor by application to the legislature, or to private individuals of enterprise and public spirit, to put into operation a plan for the purpose of training suitable persons to the pursuits of agriculture, who should acquire themselves the information necessary for constructing agricultural implements, and using them dexterously, and who should be able to teach others the same? The disadvantages under which laborers perform their tasks, arising from bad implements, and, as appears to me, still more from their unskilful use of them, are incalculably great. It is difficult to do that adroitly which we have never *seen* done in this manner. To tell *how* it should be done is not enough. There must be the *practical* exhibition, or the lesson designed to be conveyed will not be learnt. Negroes, as all acquainted with them know, are exceedingly dull of apprehension at best. There seems to be an inversion of intellectual vision peculiar to the race, which presents right to their view as wrong, and wrong as right; and this characteristic trait seems as natural to them as it does to some persons to use their left hand instead of the other. I have seen the experiment tried, in a great number of instances, of using the rake to gather into a bundle for binding, the wheat that had been thrown in a row from the cradle, and I do not recollect to have ever seen a single negro who, when left to himself, did not begin and go on with the operation, with his feet treading against the heads, instead of the lower ends of the straw. The same awkwardness is seen in a thousand other things. Would it not be good policy in their owners to have them com-

petently instructed in these matters? White men do not know how to labor themselves, or what amount of work a laborer ought to accomplish in a given time. To this cause, I am inclined to think, is owing a great deal of the laziness, and deceptive artifices so common to the negro race; hence the little that they accomplish in comparison with a dexterous European, or New England laborer, as those acquainted with the performances of each are well aware. Slave labor, if unproductive and unprofitable, is chiefly so, in my apprehension, because it is injudiciously directed, and unwisely managed. Much, therefore, I conceive, might be gained to the interests of agriculture in this country, were a suitable attention to be paid to implements, and to the qualifications and management of laborers. But I am happy to find that these topics have not escaped your notice, and hope that your useful publication will hereafter pursue them to still greater lengths.

Can you not say something that will be likely to have an influence in leading greater numbers of our white population to *labor, working with their own hands?* and thus do away the most unreasonable, the most pernicious, and, as I consider it, the most unchristian of all reproaches, *the reproach of labor*. Agriculture will flourish in Virginia when *white men* put their hands to it, and not very extensively, I apprehend, until this event is brought about.

BENJAMIN F. STANTON.

Prince Edward, October 9, 1834.

POUNDED BONES—THREE AND FOUR-SHIFT ROTATIONS.

To the Editor of the Farmers' Register.

Richmond 7th Oct. 1834.

In your last number, as well as in some former ones, you recommend the use of bone manure. From various accounts of it that I have seen in English works, I have been long satisfied of its great value; and as bones might be collected in large quantities in and about this place, I have very often thought of having them collected, and ground for manure, but have in vain sought for information as to the best method of reducing them to powder. On this subject all the English works I have seen, as well as your Register, are silent. If you could ascertain the best mode of performing this operation, your making it known would be a public benefit. Animal bones are generally so hard that I apprehend they would not be sufficiently ground without water-power, or at a greater expense than the object would justify. Perhaps they might be broken into fragments small enough for grinding by one of the common horse mills for breaking bark, an old mill stone drawn round a vertical axis; but I think it would cost too much labor to reduce them in this way to a powder sufficiently fine. I have thought of passing the fragments of large bones, and the smaller ones, between iron rollers, fluted or plain—the common plaster mill made stronger than usual, a tan bark mill, &c. but am by no means sure that either would answer: and as there are many bone mills in England, and some no doubt in this country, (I think I have heard of one or more in Baltimore) it is very desirable that it should be known among us what kind of machine has been found best in practice. It would be very desirable to have pub-

lic mills for the purpose; but if the machinery is not too costly, many proprietors who have water-power might have bone mills on their own plantations, connected with the water wheel of a saw, or grist mill.

Will you permit me, while I express my satisfaction with the general plan and execution of your work, to suggest that you might render it still more valuable by giving your subscribers more frequently your own views of the different improvements in husbandry, &c. recommended by your correspondents. Your modesty may suggest that this might be assuming too much for yourself, but the same objection would lie to every communication you publish which recommends any new practice, or finds fault with old ones. I am persuaded you would most generally be right, and if wrong, your remarks would naturally lead to discussions which might lead eventually to right conclusions.

I have been led to these remarks by the strong and uncontradicted approval by your correspondents of the four-course system of cropping, in wheat, corn, wheat, clover—three grain crops in four years, and the heavy censure that is cast on the *barbarous course* of two grain crops, corn and wheat, in three years, as if two grain crops in three years exhausted the land, and three in four years improved it. It is true that the latter rotation includes clover, and no one can think more highly of that invaluable plant than myself; but unfortunately, a very large proportion of us are obliged to cultivate lands naturally too poor, or too light for clover, and have not the means of fertilising them on a large scale, by animal manures or marl; but thinking, as I do, that we can have no good husbandry without clover, I am yet to learn that it would succeed better after three crops of grain than after two. The four-shift system of the active and judicious proprietors of the rich mellow soils of Shirley and Westover, may answer as to them, with the aid of animal manures, lime or marl, and standing pastures, but I think would hardly succeed without these helps, on the comparatively poor lands which most of us are obliged to cultivate. It ought never to be forgotten, that while good husbandry will succeed under a bad system, no system however good, will atone for the defects of bad cultivation.

You will not understand me as censuring the plan of farming adopted by the gentlemen I have referred to. On the contrary, I am persuaded that it will turn out very well with their good management, with lime or marl, plentiful manuring, and standing pastures sufficient for their stock; but I cannot at present believe it would answer on poorer lands without these advantages. Different rotations of crops are good or bad, not in the abstract, but with reference to soil, situation, &c. A well considered estimate of the advantages and disadvantages of this mode of cropping on lands that will bear it, and of its effects on soils less fertile, or that cannot have the benefit of lime or marl, or a large supply of other manures, would be very desirable, and I trust will ere long be found in your work.

JOHN WICKHAM.

[The information requested in regard to the pounding or pulverizing bones for manure, will be sought, and furnished as soon as obtained.

The suggestion that the more frequent exhibition of our own views and observations, on many of the various subjects presented in the Farmers' Register, could not come from a source entitled to more respect, nor to which we should be more ready to yield the objections which have formerly been stated to a general adoption of such a course.

We agree entirely with our correspondent in his remarks on the three-shift rotation; and have often wondered at the very general agreement in denouncing it as impoverishing and destructive, and of lauding the four-shift rotation as profitable, and enriching to the soil, without its being kept in view how much each of these rotations may be varied, and how widely they *do* vary in practice on different farms. The old three-shift rotation, of two successive grain crops and the third year of close grazing, is certainly destructive and abominable—but it would have been made still more exhausting, and worse in every respect, if, by the addition of another grain crop, it had been changed to the four-shift rotation, without any other alteration. The three-shift rotation of corn, wheat, and clover left to be ploughed in for manure for the next crop, would certainly make less heavy draughts on the productiveness of the soil, than the four-shift (including three grain crops,) with no greater supply of putrescent manures. There may be improving or exhausting cultivation with either of these rotations: and in this respect, neither can be said, as a general rule, to have any superiority over the other. It depends on various other considerations—such as the nature of the soil, and its greater fitness for wheat, or for corn, the facilities for furnishing vegetable manures, and their permanency when applied, &c. &c., whether either of these, on some other rotation should be adopted. The four-shift rotation seems to be most advantageous for a farm of soil fit for both corn and wheat, because by omitting or adding a grain crop, the rotation may serve when the improvement of the poorest land is just commenced, and also when the farm has been made highly productive, without altering the number of shifts, or the boundaries of the fields. Either one, or two, or three grain crops may be taken in a rotation of four years, according to the condition of the field: and the first would be enough perhaps to take from land as poor as are most of the long worn fields of Lower Virginia—and the last would be as profitable as would be required, and as scourging as could be borne, when calcareous and putrescent manures and clover had brought the same to the highest state of productiveness. The same rotation of crops will never suit both poor and rich land—and it is far more convenient to increase the number of grain crops in each rotation, as required by the increased fertility of the soil, than to alter the number of years given to the rotation.]

CULTURE OF THE VINE IN ROCKBRIDGE.

To the Editor of the Farmers' Register.

Lexington, Va., September 26th, 1834.

It may not be uninteresting to some of your readers to know that a pretty fair experiment has been made in this neighborhood in the culture of the vine. Eight years ago last spring, one gentleman in this neighborhood and myself in con-

nexion with another gentleman, obtained from Major Adlum, near Georgetown, and from one or two of the northern nurseries, a supply of grape cuttings of different kinds, and planted them. We selected a very elevated hill-side, a few miles from our village, (on the farm of the gentleman concerned with me) having a south east exposure, entirely protected from the north and west winds, of loose, gravelly soil, and not remarkable either for its fertility or poverty. On this spot we planted our vines, placing them in rows about twelve feet apart, and from six to ten in the rows. They generally grew pretty well—that is to say, a large proportion of the vines lived. They commenced to bear a little, I think, the third year after they were set out, and have been gradually increasing in size and productiveness up to the present time. This year, had not the spring been so unfavorable, we think we should have had quite a *smart* crop: as it was, the quantity was very much diminished, and a large number of the grapes did not come to perfection. We have ascertained from our experiment that of all the different kinds of grapes we have tried, there are but few worth cultivating in this climate. Two are particularly worthy of notice, both of which we obtained from Major Adlum—they are called the "Isabella," and "Catawba." The vines grow most luxuriantly, having evidently found a congenial soil, whilst nearly all the rest, although they live and even grow slowly, look stunted and seem to be dragging out a miserable existence. The Catawba and Isabella produce fine large clusters, many of them weighing over a pound. The first, while ripening, is of a beautiful pink, and when fully ripe of a very deep copper color. The latter when ripe of a very dark purple nearly approaching to black. They are both very fine table grapes, particularly the Catawba. I think it decidedly not only the finest grape but the finest fruit, I have ever eaten. They can be kept as well as the apple by simply packing them in layers with very dry saw-dust. We had good fresh grapes on the first of May of the preceding year. The Fox grape we have tried. The vines grow most luxuriantly, but they have borne only a few scattering grapes. We talk of cutting them down this fall as cumberers of the ground. We have one Scuppernon vine growing in our vineyard, the cutting for which we obtained from a friend in Richmond. This vine seems to grow tolerably well, but as yet (this being the fourth year) has borne no fruit. A few little grapes were found on it this year, but did not come to perfection. It is a perfect anomaly among vines; in its extreme appearance it resembles no other vine but looks much more like a hazle bush. It is said that in some of its other properties it differs from any other vine, such as not requiring to be pruned, &c., but of this last we know nothing of our own knowledge.

We are now making some experiments with some carefully selected *native* grapes, but have not had sufficient time as yet to say what will be the result. The grapes we think are improving both in size and flavor as the vines grow older.

In another communication, if you desire it, I may give you our experience in wine making, &c. &c.

JOHN F. CARUTHERS.

CUNNINGHAM AND NORTON GRAPES.

To the Editor of the Farmers' Register.

Richmond, September 20th, 1834.

I have sent you a small box by this evening's steam boat, containing two varieties of grape, Cunningham's Prince Edward, a native of the county of Prince Edward, and Norton's Virginia seedling. The American Farmer had something to say about the seedling the last year; you may recollect it—you are now to judge for yourself. Both varieties are abundant and never failing in their crops. Any portion of the state will yield them to a certainty, and if the culture of these fruits is attended to, the United States in a few years will cease to import wine.

D. N. NORTON.

[The grapes referred to above were received after five days had passed of the rainy weather in the latter part of September. Owing to this delay probably, many of the Norton grapes had rotted, or showed the commencement of decay, though the greater part were still sound. The Cunningham grapes were in better preservation, and were remarkable for the firmness of the bunches. Our family jury of tasters were about equally divided as to which possessed the better flavor; but all agreed that both kinds were excellent. The sweet of the Norton was the more unmixed and luscious—that of the Cunningham was flavored with enough of acid to make it (according to our individual opinion) still more agreeable to the taste. In both, the saccharine principle appeared to be abundant. The unfavorable opinion respecting the Norton grape expressed in the American Farmer, and referred to in Dr. Norton's letter, may be seen at page 301, vol. I. of the Farmers' Register.]

We have inserted above, and previously, several different articles which present a favorable prospect of the culture of the vine in this country—and shall be better pleased to be enabled to offer more full and more satisfactory accounts from the same, or from other correspondents. We feel much interest in the success of this culture, not only as a new and profitable branch of agricultural enterprise and industry, but because we fully believe that the extensive production of pure and unadulterated wine in any country is one of the surest safeguards against drunkenness being a national, or prevailing vice. But although the hope of the extended and general culture has often been held out by different persons, the best proof has not yet been furnished by the successful and profitable general results of the labors of any one individual. Why this has not been done, or if done, why the public are not informed of it, we are not able to say. We request of the many cultivators of the vine among our readers to communicate their views as to the causes of the small degree of success, and the variable and very uncertain results, heretofore obtained—and whether there is any obstacle to prevent grapes being produced plentifully, and wine made profitably, as a regular branch of husbandry, in the Southern States. There is no doubt as to our being able to raise delicious grapes, and sometimes abundant crops of them—and also that from them excellent

wine has been often made. The question is, can these results be obtained with enough certainty, by attention to proper rules, to make the pursuit at least as profitable as the cultivation of corn, or wheat, cotton or tobacco?

We propose soon to republish Mr. Herbemont's method of making wine. This was intended to have been done just before the commencement of the present wine making season, but was prevented by unavoidable circumstances. In the meantime, for the purpose of making the publication of more value to our readers, we particularly recommend to its author the consideration of the foregoing inquiry—which he is peculiarly fitted to throw light on, not only from his own attention to the subject, and his devotion to the pursuit in this country, but also from his personal knowledge of the vine culture of France.]

VETCHES, &c. PLOUGHED IN.

Under this article may be included all sorts of green manure. Amongst the most active parts employed as manure, I have found the wild species of the genus *Sinapis*, ploughed in fresh in the bottom of turnip drills, at the rate of twenty tons per acre. The produce brought by auction £12, while the rest of the field manured with twenty tons of farm-yard dung, brought only from £9 to £10 per acre. Other weeds, such as nettles, thistles, ragwort, &c. produce crops superior to farm-yard dung. Potato stems, fresh ploughed in on clover lay for wheat, I have found to produce crops exceeding by two bolls per acre, in quantity, with more proportionate weight of straw, the other parts of the same field manured with farm-yard dung, but otherwise under the same circumstances. The stems from three acres of good potatoes, will manure an acre for wheat to much better purpose than 15 tons of farm-yard dung, the usual quantity allowed in that part of the rotation; clover after wheat being the crop which generally precedes fallow. Under the head of "green manure," I may mention an experiment I this year made with pea straw converted into dung without the aid of cattle. Having something of that sort on hand about the middle of last May, and being in want of some loads of manure to finish a potato field, I had the peas thrashed at the mill, and the straw and chaff carried to the side of the potato field, and made up like a large hot-bed, giving each layer of straw an ample watering. Fermentation soon commenced: and by the fifth day the mass was so far decomposed as to be easily filled into the carts. The effluvium in filling was almost intolerable. It was in this state laid in the bottom of the drills; the sets of potatoes were planted above, and the earth ploughed over the whole. Notwithstanding the dry nature of the ground, and the dry state of the weather in the summer months, the part of the field manured with decomposed pea-straw yielded a better return than where farm-yard dung was applied.—*Loudon*.

For the Farmers' Register.

IMPROVEMENT OF WORN LAND.

This is an age of improvement. The arts are advancing, facilities of intercourse greatly increasing, with accelerated march to their higher

destinies. Shall the agriculturist, the bone and sinew of the country, remain indifferent amidst the general improvement, and make no effort to restore the Old Dominion? I am persuaded they will not. Agricultural societies are forming in many parts of the country, and if fostered, will exert the happiest influence, by disseminating among the people every new and important discovery in agriculture. The field is wide, and the societies might elicit the energy of practical men by premiums for the best essays on agricultural subjects written for *gratuitous circulation*. A system of improvement better adapted to the age in which we live might be introduced in this way, as it is a matter of general concern.

If any system can be devised by which the worn lands can be restored, emigration to the west would cease. The idea exists that nothing can be done for the old lands of Virginia, (an entire mistake.) I live in the tobacco district of country, and as it is the most exhausted part of the country, I will give my views, and hope that others more experienced, will follow the example. The improvement of land exhausted by the culture of tobacco is a subject of deep interest. Every planter is interested, and should contribute to the spirit of improvement by some hint, some experiment or observation.

The improvement of the worn lands in this region of country, the waste of many years, will require more patience and perseverance than can be brought to bear successfully at present; for as long as we have land to clear, or much land in good heart, there will not be much improvement, as *nothing*, it seems, but dire necessity can influence us to make the effort. This we learn from the fact, that all owners of exhausted land are often brought to the dilemma of deserting the country, or improving their estates—and here I would remark (with shame be it said) that few, very few, are in enviable circumstances—comparatively few in possession of lands in a state of improvement.

Our lands are deteriorating, and we are virtually driven, by the force of circumstances, to abandon the old plan of manuring one or two lots only for tobacco near our dwellings, and to commence some system of improvement for every species of *crop*. The returns from our fields of grain are diminishing yearly—every man of candor will admit this fact. As to the modes of improvement, fortunately, we have means *plenteous* and *various*; there is, we all know, nothing wanting but the *will*, and the *industry*. Suppose one month in the fall of the year was devoted to the collection of litter, the leaves that fall in our forests, whether of oak or pine, would afford an inexhaustible *supply*. They should be carried into the farm pens and stable yards, before they have been dried with the winter winds, together with corn stalks, wheat straw—shrubs and brush, thrown on the galled land; and if all land should be covered with leaves directly from the woods, I have seen the happiest effect on stiff land, and once knew a planter who said he desired no better manure—he was very successful. He made it a business to cover his tobacco lots every year.

The present aspect of the country exhibits a wilful waste. There is yet a great deal of downhill ploughing. This subject deserves the immediate attention of every cultivator, for no improva-

ment can be made in the face of the country, without hill-side ditches, or trenches, to which the cultivators of the soil have been timely aroused by the pen of Mr. Bruce. The precipitate discharge of the rain-water may be prevented by these graduated channels, and a system of improvement now commence under their protection.

I have commenced the improvement of land heretofore cultivated in corn and small grain, relying on clover and herds grass to keep up my tobacco land. I am satisfied from frequent experiments, that tobacco does better after herds grass than any other I have tried; certainly better than after clover, for I have observed that tobacco is generally faded and sickly after clover, unless plastered. Herds grass has a most happy effect on all lands I have tried, both stiff and sandy; and I think, I may say, it restores the land nearer to its virgin state, than any other improver. After three or four years in grass, the land may be cultivated as many in tobacco without manure. Sow it down afterwards in wheat and grass. The improvement from herds grass is derived almost entirely from the roots giving a strong turf. The top I have never considered important to fall on the land, as it becomes very dry after ripening. Land in grass improves if mowed every year, with the addition of yielding rent in the way of hay. As I before observed, I have commenced the improvement of my grain land, and shall go on *pari passu* until I can say, there has been a visitation, not in an evil sense, to every nook and corner; when every acre of land shall have received some aid to resuscitate it, and without which, our lands cannot be restored.

Surface manuring I am persuaded is the most expeditious mode of improvement. Of its effects I have no doubt. Look at the yards of old settlements, made rich, inexhaustibly so, from surface manure. The places where grain, hay, &c. are stacked, seem never to lose the influence. Farm-pens and cow-pens are enriched by the juices that operate more immediately on the surface. It is my practice to change my stacking places and farm-pens every year, and by that process have improved much exhausted land, always selecting the poorest places.

I have observed also a marked difference in the crop when the manure is suffered to remain a short time in piles: the impression or stain gives life to the land that is not imparted by manure ploughed under.

I am inclined to the opinion, that we should manure our lands one year in advance of the crop to be cultivated, the manure to be applied as a top dressing. It would certainly give a most luxuriant crop of *weeds and grass*, after which, all crops do well. The objection to manuring, the same year of cultivation, is that in very dry seasons the manure, although ploughed under, does not incorporate, and the benefit is lost to the growing crop.

In the spring of 1832, I carted out some stable manure, and put it in heaps on exhausted clay land, from which places the manure in a few days were removed, leaving nothing but the impression or stain. In the spring of 1834, I observed that every place where the piles lay, a fine turf of herds grass might be seen, and the adjacent places where the manure was not put, remained destitute of any verdure—there was no design of experiment—the manure was thrown there for the purpose of manuring an enclosed piece of land, to

which the cart could not conveniently go. If top-dressing should be resorted to, and we would supply our stables with herds grass hay, a sufficiency of seed would be mixed with the manure to improve any land. If the fields, the barren fields, that offend the eye of the traveller and tells the poverty of the owners, were sprinkled, after a deep fallow, with herds grass manure, I have no doubt the scene would be changed, as indicated by the places from which the piles of manure were removed.

I hope these remarks may be received with that allowance due to one unaccustomed to writing for the public eye. If any hint or suggestion here should be regarded as useful, in the way of improving the worn lands, I shall be amply remunerated for this communication.

M.

For the Farmers' Register.

CONSTITUTION OF THE BUCKINGHAM AGRICULTURAL SOCIETY.

Article 1. This society shall be known and called by the name of "*The Buckingham Agricultural Society*."

Article 2.—Section 1. There shall be an annual meeting of this society, on the third Thursday in October, at such a place as may be fixed upon by adjournment.

Section 2. One-fifth of the members of the society shall constitute a quorum at the annual meetings.

Section 3. If from any cause a quorum should not attend the annual meeting, the next day shall be the day of meeting, and should a quorum still fail to meet, the officers elect shall continue in office until the next annual meeting.

Article 3.—Section 1. There shall be a president, three vice presidents, a corresponding and a recording secretary, a treasurer, and a board of directors, to consist of the officers, and six other members all to be chosen annually. All elections shall be *via voce*; and a majority of the members present shall be necessary for a choice.

Section 2. It shall be the duty of the president, to preside at all meetings of the society and board of directors. In the absence of the president, one of the vice presidents shall preside.

Section 3. The president and vice presidents shall be ineligible for one year, next after their time of service shall have expired.

Section 4. It shall be the duty of the recording secretary to make and keep a fair record of the proceedings of the society and board of directors.

Section 5. It shall be the duty of the corresponding secretary to conduct all correspondence for the society and board of directors.

Section 6. It shall be the duty of the treasurer to receive all dues to the society, and pay all demands as ordered by the society and board of directors, and render and settle his accounts at each annual meeting.

Section 7. It shall also be the duty of the treasurer, at each annual meeting, to make report of all members that have failed to pay their annual contributions or other dues to the society, and if any member or members shall be reported thus delinquent, for two annual meetings successively, such member or members shall no longer be regarded as belonging to the society, and shall not thereafter

be so considered, without first making payment of such arrearages.

Section 8. It shall be the duty of the board of directors, to specify to what objects premiums shall be awarded, and what amount: and transact all other business necessary for the well being of the society.

Section 9. There shall be committees of three appointed to award premiums to the various objects designated.

Article 4.—Section 1. The payment of two dollars by a citizen of this county, or any one owning and cultivating a farm therein, and such annual contributions as may be required by the society, shall constitute membership.

Section 2. Any member may withdraw whenever he thinks proper, by notifying the recording secretary, after having paid his dues.

Section 3. Each member of this society, at their annual meetings, shall furnish an essay upon some subject connected with the objects of the society.

Article 5. Before an adjournment, the proceedings of the society and board of directors shall be read, and signed by the president and recording secretary.

Article 6. Two-thirds of the members present, at any annual meeting, may alter or amend this constitution.

Signed,

THOMAS M. BONDURANT, *President.*

Granderson Moseley, *Rec. Sec.**

From the Rail Road Journal.

RAIL ROAD IN VIRGINIA.

Orange C. H., Va. October 1834.

Dear Sir,—I have noticed in the Virginia Herald a project for a railroad from Fredericksburg, or the Great Bend of the Potomac, to the Virginia Springs, through the Blue Ridge, &c. I look upon this scheme as both practicable and grand, as far as it goes. But one has only to open his eyes upon your new Rail Road Map, which should be in the hands of every friend to internal improvement, in order to be convinced that if this rail road is continued on from the Virginia Springs to the ever navigable waters on the Great Bend of the Ohio at Guyandot, it at once opens the most superb highway that can possibly be constructed in the United States, to the great West. It unites the great South west with the Atlantic in a much shorter distance than the great Erie canal; and when completed, will enable the farmers of the west to carry their corn, which now sells for 12½ cents a bushel, to the city of New York in less than 48 hours. Besides, the public will be accommodated in carrying from the great Valley of the Mississippi, and thence through Fredericksburg and Washington, Baltimore and Philadelphia, to your city, in a comparatively short period; whereas, to my knowledge, hundreds, if not thousands have, during the past season, waited at Guyandot, day after day, for want of conveyance to the White Sulphur and the northern cities. All the travel from the South west to Washington city,

* In the proceedings of the Buckingham Agricultural Society, in No. 5, the name of Granderson Moseley was incorrectly inserted as George Moseley.

during the session of congress, will of course fall into this track, the route being nearer and quicker than any other. The inhabitants of Kanawha are now ready to do much for the construction of this road, in order to give free transport to the millions of bushels of salt now manufactured annually at their works. A few days ago I saw a merchant from near the salt works on his way to Philadelphia and New York to buy goods, which he said he should send home by way of Pittsburg or Wheeling, and that he must wait for rains, because the Ohio was quite too low at this time, and at the best it required four weeks at least. Were the rail road of which we have been speaking completed, it would require no more than 44 or 45 hours to transport the same goods from New York. If I had time I might mention other advantages, but I only wish to call the attention of the public to this route, and I am sure that they will at once see those advantages, and save me the trouble of mentioning them. I am glad to learn that wood for rail roads can now be made durable, as it will greatly lessen the expense of excavations and embankments. In the route above mentioned, there are but few streams to cross, and the gaps through the mountains render it comparatively a level grade. I remain, dear sir, very respectfully, yours,

J. MACADAM, JR.

From the Free Press.

GREAT SALE OF IMPROVED STOCK IN JEFFERSON COUNTY, VA.

At the sale, last week, of the improved stock upon the farm of the late Henry S. Turner, Esq. the following extraordinary sales were made:

One Durham Cow, 8 years old, for	\$255
One do. Bull, 2 years old,	325
One do. Heifer, 1 year old,	231
One do. Bull Calf, 4 mo. old,	162
One do. Milch Cow,	130
One do. do. do.	155
One do. do. do.	120
\$1378	

From the British Farmer's Magazine of July 1834.

ECONOMICAL MODE OF PREPARING FOOD FOR CART HORSES.

In a former number of this work a correspondent proposed an inquiry as to the most economical mode of keeping cart-horses in town. We were in hopes some of our readers, acquainted with the subject, might be induced to furnish us with the means of gratifying him, but being disappointed in this expectation, we ourselves instituted an inquiry, and have, at length, been enabled to make an authentic statement of the best practice, and the most economical, which has ever come under our notice.

Our attention was not improperly directed, in the first instance, to the condition of the various fine teams of cart-horses, which all visitors to the town of Liverpool must have seen and admired, because we presumed that our correspondent did not seek information how some miserable animal might be enabled barely to exist under severe

work, but how high condition might be maintained, under such circumstances, at the least expense. In the course of investigation we were much struck with the beautiful condition of the Earl of Balcarres's horses ten of which are kept in Liverpool for the purpose of delivering the coal brought thither from his lordship's mines, and by the kindness of Mr. Cannell, his lordship's agent, though not, it is true, without some demur on his part, as to what appeared so inquisitorial an investigation, we are enabled to make a statement which may be implicitly relied on.

Lord Balcarres's horses, like most of those used for draught in this town, are particularly large, and in a district quite celebrated, and justly so, for this description of horse, we certainly have seen nothing equal, take them altogether, to his lordship's teams. So superior are they, indeed, that we venture to recommend any agricultural visitor to Liverpool to make a point of seeing them. They are principally horses bred in Lancashire, and of the black breed which has long been the boast of the farmers in the neighborhood of Liverpool.

It may not be improper to preface the account of the manner in which Earl Balcarres's horses are kept by observing that they make long days, and the average load of two horses is three tons, including the cart.

The following is a statement of the nature, quantity, and cost of the food consumed by ten horses during seven days. The outside current prices are charged for each article, and, of course, the reader will bear in mind that a different state of markets will vary the cost of maintenance.

Keep of ten horses seven days:

	£	s.	d.
33 bushels (90lbs per bushel) of potatoes, steamed, at 1s. 6d. per bushel, . . .	2	9	6
2½ bushels (60lbs) of barley, crushed very fine, at 4s.	0	10	0
2½ ditto beans (60lbs) do. at 4s. 6d.	0	11	3
22 stones (20lbs) of cut hay to mix with potatoes, at 9d. per stone	0	16	6
14 stones (20lbs) of hay uncut, at 9d.	0	10	6
Fire and labor, ...	0	2	0
	£4	19	9

We repeat that the horses kept thus are in the highest possible condition and health, and while we re-assert that the particulars of the statement may be relied on, it will be admitted that this plan, which has been adopted in Ireland, and also America, is well entitled to be called *economical*. To what has already been said, it may be proper to add, that a mode of horse-keeping, similar in nature, has long prevailed among the farmers of Lancashire, but they have not benefited to any thing like the extent which the adoption of the perfected system, previously mentioned, would allow of. There is, however, no reason why they should not do so, and it may be hoped this statement will reach the hands of some influential occupier, who will regard the matter in its proper light, and by his example promote what our recommendation might otherwise in vain attempt.

FOUR-FIELD ROTATION—TURKEY WHEAT.

To the Editor of the Farmers' Register.

Westover, October 11th, 1834.

My wheat crop of this year has not met my expectations fully, though a pretty good one; averaging 17½ to the acre. I thought after it was harvested it would yield 20 bushels per acre. The fallow field, although much the thinnest land produced 2200 bushels, and the corn land 1300. The crop in Curle's Neck brought an average of 13 bushels on a surface of 800 acres. These crops plead much for the four-field and fallow-system, although far from being full ones. I expect in a few more years (particularly if enabled to marl) to average from 20 to 25 bushels per acre with almost a certainty, as my farm is rapidly improving from the wonderful effects of clover and plaster.

I have introduced into this neighborhood a most valuable wheat, and of which you must get some the next season for trial. It is called the turkey wheat: from what cause it takes this name I know not. It is rather a large grain, white, ripens about the same time that the purple straw does; remarkable strong straw; and consequently less liable to tumble; and if rusted, the grain seems not to be shrivelled, and I think yields as much or more than any wheat I have ever tried. It is much approved of by Mr. Chevallie who has reserved it for making family flour.

I look for each number of your valuable journal with increased interest, and cheering thoughts; as it always brings something new and interesting, to enlighten a poor farmer, and if I were an emperor (as *Jeremiah* says) I would compel every cultivator of the soil, who could spare \$5 to take it.

JOHN A. SELDEN.

ON DECOMPOSED SALT AS A MANURE.

[The following extract is from a review of the treatise which we have noticed in a former number of the Farmers' Register. Though the method by which salt is decomposed for manure, is still kept secret by its discoverer, it appears more worthy of notice, from the statements of the following article. If the author of the treatise is as worthy of credit as may be presumed from the respect with which his discovery is spoken of by the reviewer, we must consider the subject of much importance to agriculture. There can be no question of the value of soda, the alkaline base of common salt, as a manure, if it could be obtained cheaply enough; and the decomposition of salt is affirmed to be so effected, as not to add much to the expense of the material.]

An Address to the Landed Interest on the important discovery of the Decomposition of Salt for the purposes of Manure.

By HENRY KEMP. Ridgway & Son. London, 1834.

From the [British] Quarterly Journal of Agriculture.

Salt, in its common state, is doubtless a worthless and even dangerous manure. The few experiments which we made with it in that capacity soon confirmed its worthlessness in our estimation; and we have heard the late Mr. Rennie of Phantassie, who, it must be acknowledged, was an eminent agriculturist, mention that, in every attempt he made of it as a manure, the less he med-

dled with it the better for the crop. Now, the first trial of bone-dust or rape-cake would leave no such impression upon the mind. Salt being generally neglected as a manure is a proof of its inutility; for a good manure, so plentiful as salt is, would have insinuated itself, partially at least, into practice in spite of obstructions; though, we grant, the inconvenience of procuring it through the vexatious forms of the excise, may have operated against its universal dissemination. But there never existed any serious obstruction to the use of salt in agriculture. The high duty was only exacted when it was to be used for culinary purposes, and never for the purposes of agriculture. Besides, the duty has ceased for ten years, and yet how trifling is its use in agriculture, only 5000 tons a year, according to Mr. Johnson's own showing, all of which, or the greater part, may be consumed by culinary preparation, in the improved mode of feeding horses in coaching establishments. We quite agree with Mr. Kemp, when he contends "that no substance like salt, which is used only in quantities that would incur an expense of 10s. or 15s. an acre, could, at the present time, (nine or ten years subsequent to the great alteration in its price,) be considered of doubtful value, if it really possessed that decided excellence, which those who have endeavored to promote an extended use of it would have us believe."

Is common salt, therefore, useless in agriculture? By no means. It may be successfully used to destroy a host of vermin, such as snails, slugs, grubs, &c. which infest the soil and attack young plants. It is a delightful condiment in the food of live-stock. Experience has now established, that horses, for the saddle or harness, will do as much and as fast work on prepared food seasoned with salt, at much less expense, than in the ordinary mode of feeding them on dry hard food. This benefit would be still more perceptible in preparing the food in the same manner for the slow working horses of the farm. Were cattle permitted to have access to salt in the calf's crib, grazing field, and fattening stall, they would acquire an earlier maturity. See how regularly herds of buffalos and deer frequent the salt licks in America! But of all creatures sheep are delighted with salt. The graphic picture of the desire of sheep for salt, drawn by Arthur Young, and described by Mr. Kemp, is not in the least exaggerated. Many a time have we contemplated such a scene with a swelling bosom. Many a time have we envied the shepherd's life,—limb-tiring, watchful, and anxious as it is,—when we have seen the "fearful people" skipping and shaking their "woolly sides"

in sport on a fresh break of turnips, or running with eager steps for the first lick of salt.

The great object which Mr. Kemp had in view in inditing his address to the owners and occupiers of land in Great Britain and Ireland, was not so much to argue against the use of common salt as a manure, as to show that, deleterious as it is to land in its common state, it yields a valuable and economical manure when decomposed. The history of this important discovery is thus given by Mr. Kemp:—

"Notwithstanding the constant disappointment with which all my trials of salt were attended, previously to its decomposition, I felt confident that it possessed a latent property, which would one day be found of infinite value to the farmer. I was not a little encouraged in the idea which I had thus formed of the capabilities of salt, from the circumstance, that being a substance of more universal diffusion than any other, either in its marine or fossil state, so, if it could be turned to account as a really useful manure, almost every portion of the cultivated surface of the earth would derive advantage from it. The small quantity which it seemed probable would be requisite for imparting fertility, would render it every where easily accessible. The great expense now incurred by the employment of bones, and many other artificial manures, would probably be superseded by a much cheaper and more efficient article in prepared salt. I did not think the expectation too sanguine that led me to calculate on the probability that such a discovery, in providing a simple and ready antidote to the exhaustion of soils, may become the means of ameliorating the condition of the human race to a degree almost incalculable. Only suppose that, by a new and improved system in agriculture, the earth was made to yield an increase in the ratio only of a tithe greater than it did before, how materially would such a result conduce to the welfare of mankind. Now, by the discovery which has furnished the subject of this address, I feel assured, that a produce even *one-third more* than is at present drawn from the soil, will readily be procured by its proper application to it.

"Salt is composed of soda and muriatic acid, at least so we usually describe it, though there are some other matters commonly associated with them, particularly in the marine kind, but the proportion is so inconsiderable, as to be hardly worth notice, and therefore, for the object before us, it is hardly necessary to consider it as consisting of any thing more than the ingredients we have named.

"The exact analysis of salt will be found as follows:—

1000 parts, by weight, of	Insoluble Matter.	Earthy Muriates.	Sulphate of Lime.	Sulphate of Magnesia.	Pure Salt.
Bay salt (St. Ubes,)	9	3	23½	4½	960
Scotch Marine,	4	28	15	17½	935½
Lymington ditto,	2	11	15	35	937
Cheshire crushed rock,	10	0½	6½		983½
Cheshire salt,	1	1	14½		983½

The proportions of soda and muriatic acid are about forty of the former to sixty of the latter in 100 parts.

"The decomposition of salt is very easily effected for its use in the arts, and for chemical experiment. *Muriatic acid* is extracted from salt by employing the sulphuric, which latter, having a greater affinity for its other constituent *soda*, enters into combination with it, while the former is set at liberty.

"The extrication of *soda* from salt has been accomplished by the agency of red oxide of lead, and for the process a Mr. Turner, many years ago, obtained a patent. There are, I believe, some other methods of dissolving the union between the component parts of salt, which are had recourse to, for their employment in some of our manufactures, but I never heard that any of them were considered capable of rendering the article available to agriculture. For this purpose they are far too expensive. As a general fertilizer of the earth, its wholesale application requires that its preparation should be accomplished in a very cheap and simple way. When millions of acres are to have their productions greatly increased by the aids of artificial manures, cheapness will, of course, be regarded as a leading requisite. This will be found a striking characteristic in the mode pursued in the present instance, for the expense of its preparation does not very materially enhance the first cost of it.

"Always fond of experimental farming," continues Mr. Kemp, "I have taken great pleasure in making comparative trials of the efficacy and value of different manures. The article of *barilla* having been employed with this view, and affording very decisive proof that it possessed the requisite properties in a high degree, it was inferred that its operation was consequent on the *soda* which this substance is known so largely to possess. Now, this circumstance first suggested the idea of the decomposition of salt, because, if the *soda* of *barilla* could act beneficially on vegetation, why should not the *soda*, so abundant in salt, be equally efficacious? It appeared probable, therefore, if the union between its constituent principles could be destroyed, or a perfect decomposition secured, and while the *soda* was thus at liberty, a new compound be formed with the chlorine, which should deprive it of its injurious qualities as a free acid, that salt, thus prepared, would yield facilities, from its cheapness, for increasing the productiveness of the earth beyond any thing hitherto known."

This decomposed salt has been applied as manure to every species of agricultural plant, and found to exercise extraordinary influence on every kind of soil. "It is scarcely necessary," says Mr. Kemp, "that I should enter into very minute details of the effects produced by prepared salt upon every description of crop. Nearly all the varieties of plants known as agricultural, have been submitted to its action, and, without any exception that I am aware of, have fully demonstrated its great stimulating powers. Corn, pulse roots, and grass, have all attested by their great luxuriance and increased produce, the force and energy of this manure. The multiplied varieties of the culinary and flower garden have also borne witness to the general efficacy of prepared salt; and though I am aware that the superior culture usually bestowed on these departments hinders them from offering so unequivocal a test as fields that are worn and exhausted by corn, yet the superior health

and vigor of every thing to which it was applied in the gardens, afforded the strongest evidence for concluding that its agency may be as universal as dung, or any other great assistant of vegetation."

The efficacy of this decomposed salt has also been tried comparatively with bone-dust, dung, oil-cake, and whale-blubber, and its results are superior to any of them.

Mr. Kemp, we suspect, hardly does justice to bone-dust. It is no doubt more suited to a dry soil or a dry subsoil than a heavy; but the experience of this country from the Tweed to the Grampians, a space which embraces every variety of soil, has proved its value as a raiser of turnips beyond a doubt. Turnips are not raised on strong clays, and of course bones are never applied to them. As to sheep being affected with the rot by eating bone turnip, we cannot believe; because a bone turnip is always harder and more astringent than one raised with dung. We suspect "the worthy farmer" was trying the extent of Mr. Kemp's faith in this matter. Should such, however, be the fact, we should like to see it authenticated. The particular instance adduced by the farmer is no proof of the fact, for we have seen the nature of the subsoil affect the feeding quality of the turnip more than manures. In this country, sixteen bushels of bone-dust are quite sufficient for the imperial acre, which cost just two pounds; and if the bone-dust is mixed with ashes, half that quantity will serve.

Mr. Kemp recommends an excellent method of mixing the viscid whale-blubber with soft saw-dust, at 25 bushels per acre; but where is saw-dust to be obtained in such quantities? A friend of ours for a long period used a great quantity of blubber every year. His practice was to mix it with earth, by making a bed of earth like the plasterer's bed of sand and lime before the water is poured in. The blubber, thus mixed stood about a year and a half, and was then applied as top-dressing to old grass. The benefits were great, every plant of moss being extirpated by it. Green blubber will injure any growing crop by its causticity; and even a compost formed on grass will affect the ground so as not a particle of vegetation will grow upon it for years. We have heard of a similar effect being produced by brimstone. A vessel partly laden with brimstone from Messina to Leith, was stranded on the English coast near the Coquet Island. The brimstone, 50 or 60 tons, was taken out and piled in a heap on a piece of old grass. It lay there for three months till the vessel was repaired. For fifteen years not a plant would grow upon the spot occupied by it.

Mr. Kemp makes some very judicious remarks on planting, and proves the beneficial effects of manure on the growth of trees. Many an acre of ground has been planted in a state utterly unfit for the purpose. Nothing but a set of diseased rickety sticks, offensive to the eye, grievous to the heart, and unprofitable to the pockets of the proprietor, could be expected from such management. Many a tree plant, which has cost much care in the nursery, has been cruelly starved to death in the moorland.

In the application of decomposed salt, Mr. Kemp says, one ton is sufficient for three acres. By the help of three horses, three men will sow of salt and seed eight or ten acres of turnips in a day with a drill-machine, but with a broadcast one,

more. The salt produces one-third more of corn than the best dung, and its cost is only about 10s. per imperial acre.

We thus see that decomposed salt is suited to every purpose of field and forest manure. But what is this decomposed salt of which so much has been said, and how is it to be obtained so cheaply? We shall give Mr. Kemp's own answer to these questions. "I think I have now said enough," says he, "on decomposed salt, to engage the attention of all who are interested in the subject of manures. The reader has probably expected long ago that I should develop the process whereby the new material is prepared. He has, I dare say, concluded that every succeeding page would afford him the desired information, and I admit that such an expectation was natural enough previously to his being apprised of my intentions. When my letter on the discovery was first published, a good deal of curiosity was produced by it among agriculturists, and many who wrote to me on the subject requested I would furnish them with the particulars necessary to reap advantage from it. I replied, that I was quite prepared to promulgate the plan, but that I conceived myself entitled to some remuneration; and added, I was sure they could not expect such exclusive disinterestedness on my part, as that I should forego my claim to compensation, while the advantages received by both farmer and proprietor would be of so much importance to them. I would beg now to repeat, that I am confident no reasonable person will feel inclined to charge me with being *un-reasonable* for hesitating to give the desired information gratuitously.

"The '*quid pro quo*' is so universally acted on, and is so completely the governing principle in all the transactions of life, that surely there is no room for a feeling of surprise that a *consideration* should be expected for what I am persuaded would be admitted to be of infinitely more value than any pecuniary acknowledgement. No candid or reflecting mind will be disposed to cast an imputation of selfishness, when all that is desired is merely simple justice."

We are sorry that Mr. Kemp has taken this determination. We do not impute selfishness or unreasonableness to him. Every sentence of his little book is the production of a candid and liberal mind. But how can he benefit himself by keeping the secret in his own bosom? There are only two ways by which he can *secure to himself* the benefit of his discovery, but neither of them will benefit the public. The one is by keeping his own secret, the disadvantage of which Mr. Kemp no doubt already feels; the other is by manufacturing the article himself in some central part of the kingdom, say London. But, as a commodity which is sold cheap cannot afford to pay a high carriage, the public in the distant parts of the kingdom will derive no benefit from his valuable discovery. As to a patent, it would be universally infringed, for the process of making the salt must be simple, otherwise it could not be sold cheap, and to prevent the infringement by prosecutions would be as impracticable as to convict a large mob in a city of a misdemeanor. Mr. Kemp cannot expect a reward from the landed interest, for they will not subscribe for a new article whose specific efficacy they have never witnessed. How, then, can he obtain a remuneration for his discove-

ry, which it is reasonable he should receive, and the agriculturists at the same time enjoy the benefit of it? Our advice to Mr. Kemp is what we ourselves would do under similar circumstances.

We would at once divulge the secret widely, the more widely the better, and take the chance of remuneration. There is no other way of securing the benefits equally to himself and the agriculturists, and through them to the nation. Parliament cannot truly be charged with illiberality in grants to private individuals, whose discoveries have benefited the nation. A reward was given to a person who invented the making of biscuits for the navy with machinery. Mr. Macadam also received a Parliamentary reward for introducing the improved mode of making roads. A Parliamentary grant has been conferred on the gallant Captain Ross, for his intrepidity, sufferings, and discoveries. Mr. Marshall received a handsome remuneration for his valuable statistical tables. Mr. Gurney is at present applying for, and we hope he will obtain, a Parliamentary grant for resolving the important problem, that steam carriages can travel on common roads. Now Mr. Kemp's discovery, if it supports the character he has given of it, and experience alone can determine that, will be more deserving of a Parliamentary reward than any of these meritorious individuals, because it will be vastly more beneficial to the nation than any of these circumstances enumerated, important as they all are in their respective spheres. But should Parliament purposely neglect the claims of Mr. Kemp, from the landed interest "verily he shall have his reward."

EXTRACTS FROM PRIVATE CORRESPONDENCE.

Hanover, September 16, 1834.

I have carried out very little marl yet, only eight or ten loads, from a poor bed which I could get at conveniently. I have had so much ditching and fencing, as to be kept from improving, which I shall have a good chance for, if I can get time to open a bed or two of marl, with more shells than the one above, which I am very sure I have. The fencing is a terrible drawback—I have just paid my state and county taxes, which I regard less by far. A carpenter passed through one of my fences lately, and observed, "if he had one of the rails at his house it would be worth twenty-five cents;" it was a large white oak from the but cut; if he had looked a little closer, he would have found maple and ash used for the same purpose—if we had saw-mills convenient, it might be better to use plank. I am turning out the poorest of my corn ground to grow up in pines to help out—it is possible that my case may be harder than common, but many must be getting very sensitive on this subject.

Brunswick, October 1, 1834.

Could you not notice the road law in your publication? If you can, you ought to tell the people that it is an extreme hardship, that a poor man who has no use for a road, and can do all of his travelling and carrying through a piney old field, as well as over a road thirty feet wide—who has but one negro, and not a soul at home to get a stick of wood for his wife and children, should be

compelled to labor on the road for the rich man's use, whilst the rich man is attending to his own business, or pursuing his own pleasure. It is about the only case in our country in which taxation is not proportioned to property.

[The road law, and its execution, are obnoxious to more and heavier charges than that brought by our correspondent. The subject is important, and its discussion will produce much benefit, as soon as it appears that our legislators are disposed to remove any of the useless yet heavy burdens which now press upon agriculture.]

—
Amherst, 13th October, 1834.

Our crops of corn and tobacco (the latter our staple) are better than usual, and all safely housed from frost.

—
Buckingham, October 14th, 1834.

* * * * So soon, however, as I fix upon a place of location, I shall avail myself of the valuable information afforded by your excellent journal. I conceive that no man, however limited his agricultural operations may be, should deprive himself of the pleasure of reading, and the instruction thereby gained in relation to the best methods of cultivating the earth, for the consideration of the small sum of \$5. I am well convinced that the Register has imparted new vigor to the system of improvement, in every section where it is taken. The sterile fields are already beginning to show marks of reviving fertility, and the abominable system, so long practiced, of ploughing up and down hills, is gradually giving way. It gives me much pleasure to find that the Register, so far from decreasing in interesting and valuable communications, as was anticipated by many, who ought to have known something of the extent of the subjects on which it treats, evidently sustains its reputation, by gradually improving.

—
Tuscaloosa, Alabama.

Our crops of cotton some six weeks since were very promising, more so than I ever saw them; but from the drought, and an insect that cuts off the squares and perforates the half grown bolls, our crops will be very much shortened in my section of the state.

—
October 7th, 1834.

* * * * * tenders his warmest salutations to his respected friend, and hopes that his work is well supported and his zeal unabated. To keep up a given projectile force is not easy. I do all I can for you—but ten will borrow my numbers of the Farmers' Register, for one that will subscribe. Success must await you.

[The fact stated by our correspondent above is not peculiar to his county, for we have had similar reports, and almost in the same words, from others. However, it is gratifying to receive even this kind of attention—for next to having the Farmers' Register bought and read, it is most pleasing to us that it should be borrowed and read. But if our friends the borrowers, would

consider that the whole subscription price of the work amounts not quite to 10 cents a week, they would find that it is almost as cheap to buy and retain, as to borrow and return the numbers.]

DEATH OF THE MULE'S COLT.

To the Editor of the Farmers' Register.

* * * * * As the birth of the phenomenon, *my mule colt*, was recorded in your Register, so I will, with your permission, record his death, that the learned may speculate upon it. He was born, as I informed you, and as will be seen in your Register of May or June 1834, on the 23d of April 1834; and died on the 20th of October 1834, at night. The particulars are as follows: on Friday evening late, I was informed that the mule colt was sick: upon examining him I thought he had the staggers. He was freely bled, and put in a lot and went to eating fodder; it was now dark, and I determined that in the morning I would commence blistering, purging, and the use of injections, which I have never known to fail if taken in time—but in the morning he had the lock jaw, and so nothing could be done effectually for him, and he died on the Monday night following. He was weaned, and running in a good pasture with a horse colt, also just weaned, which is doing well. Now was it the staggers, or what disease? Or was ever a colt delivered of a mule known to live? I should have been much pleased to raise it, and to have known if it could continue its species.

JOHN T. KILBY.

Nansemond, 22d October, 1834.

FENCING—MARLING.

To the Editor of the Farmers' Register.

* * * * * I will not let slip this opportunity of expressing my gratification that the grievous tax imposed on us by our fence law is becoming the frequent subject of animadversion in the Register, but it is still doubtful if half the evils and difficulties brought on us by the destruction of our timber, quarrels among neighbors, and the employment of our hands and teams so long, have been sufficiently pointed out. Cannot some of your correspondents who are competent to the task be induced to undertake this? Every year is adding to the evils we are laboring under, which I feel warranted in saying are already formidable, and in some cases almost intolerable.

I have the pleasure of informing you that most decided benefit has resulted from the use of marl in this county, particularly on Mr. Sutton's farm near the court house. In a few cases I have heard of a supposed damage from the use of the earth lying above the shells, having impressions only of the shells; from the very little carried out by myself I thought I saw an improvement in the corn.

Although it may be considered somewhat out of season, as the next harvest is so distant, I beg leave to make a short statement on another subject. It has been three years since we have made use of spirits in harvest, having substituted molasses with a small quantity of vinegar (cider would probably be better)—in that time I can recollect but one case in which a cutter was obliged to stop from indisposition, and in that one, the man lost only a

day and a half, and withal was not used to working in the sun: he probably used the molasses too freely. I am induced therefore to believe that experience so far justifies this change, and would, with deference, recommend it to others, especially as it was rather common for our mowers to complain and "lay up" about the winding up, or very soon after harvest, when we used spirits.

C.

Hanover, Sept. 16, 1834.

P. S. I have been told that many of the hogs in this neighborhood have died in the course of the summer—those who turned their hogs out have probably suffered most; one of my neighbors who did so has lost about half her stock.

THE MOUNTAIN REGION OF VIRGINIA.

Fairfax County, Oct. 1st, 1834.

To the Editor of the Farmers' Register.

I have lately returned from visiting some of the watering places over the mountains, and as I am watchful of every thing in which the great interest of agriculture is concerned, I will give you and your readers a short sketch of what I could see from my carriage window. I saw nothing worthy of notice until I reached the farm of Charles Calvert Stewart, Esq. This is situated in the red sandstone district, the most improved and improvable part of Fairfax county. The harvested crops appeared to be abundant—the crop of corn, then in full shoot and silk, was strikingly so. Fourteen miles farther on we entered the hills, or mountain country. I wish sir, I had descriptive powers to give you a "bird's eye" view of this delightful country, which is surely destined to be the pride and boast of Virginia. Broken down in health and vision, in the fulness of my heart, imagination mingled in the vegetable and animal joy around me. Pleasant are thy high places, and green thy mountains, O Virginia. And yet sir, 40 years ago this very land was a heavy article at 20 shillings per acre. Broken, and gullied, it seemed the home of misery: and now from the use of good ploughs, clover, and plaster, it is the home of plenty. Hundreds of fat cattle bellow around the hills. May I ask why this whole land cannot do the same? Will the good people of Virginia shrink from that duty which makes them rich, and their State respectable? We know that they would readily meet and make a president for this whole union—yet I much doubt if they would meet and say that the law should protect every man and his property—I mean, sir, his land. As for the horse he requires no five foot fence "so close and strong that the trespasser cannot creep through" and as for money, or old clothes, they have no need of a strong five foot chest—it is poor mother earth that must be persecuted, defaced and desolated. When the "blast of war" is blown to what description of property do we look to support it? Mainly, sir, to this very unprotected outlawed land.

Upon passing the mountain you reach a country created out of very different materials and evidently for a different purpose. It is limestone base, with sometimes a thick and then a thin covering. No better land could be found for the production of small grain. The cultivators evidently depend upon the known powers of their land, and tax it

extravagantly. This practice will be corrected by the division of property. To speak generally, this Valley is unskillfully cultivated—yet I often heard of \$60 per acre for land. The drought has been very severe and the crop of corn with some exceptions bad. A Chinese mandarin with *full powers* would soon make the land of this Valley worth \$100 per acre.

JEREMIAH.

For the Farmers' Register.

AN IMPROVED METHOD OF SEEDING BEDDED LAND IN WHEAT.

Instead of sowing (as is usual) a single bed at once, sow from the centre of one bed to the centre of the other, by which means you will have your wheat thickest on the top of your bed—whereas by the old plan it is almost always thickest in the water furrow, where it is sure to be lost if the land is low and wet.

T. G. B.

From the Southern Religious Telegraph.

HAMPDEN SYDNEY COLLEGE.

The commencement at this Institution took place on the 24th September last. The order of exercises was as follows.

I. *An Oration*—On the advantage or pleasures of reflection—*Goodridge A. Wilson*, Prince Edward.

II. *An Oration*—On the importance of variety of knowledge, with some incentives to literary exertion.—*John T. Harris*, Cumberland.

III. *An Oration*—On some of the peculiar traits in American history.—*Anthony Thornton*, Cumberland.

IV. *The Osiotic Oration*—Milton and Byron—their comparative excellencies.—*Francis B. Watkins*, Goochland.

V. *An Oration*—On the importance of ascertaining the proper limits of the human mind and the objects to which it should be directed.—*Henry E. Madison*, Prince Edward.

VI. *The Philosophical Oration*—Progress and prospects of society.—*Robert B. White*, Winchester.

VII. *Master's Oration*—*Alexander Scott*.

VIII. *Master's Oration*—*Thomas S. Flournoy*.

IX. *Degrees conferred*.

X. *An Oration*—On the duty of American scholars as citizens of the republic—with the valedictory addresses.—*James H. Morrison*, Lunenburg.

The degree of Bachelor of Arts was conferred on John T. Harris, H. E. Madison, Jas. H. Morrison, Anthony Thornton, Francis B. Watkins, R. B. White, and G. A. Wilson.

On Thursday the 25th, the Institute of Education held its second anniversary meeting, when it was addressed in a highly interesting and able manner by James M. Garnett, Esq. of Essex, on the advantages of Literary Associations.

From the Louisiana Register.

CORN.

Mr. Editor:—As the season is now approaching when farmers will commence gathering corn crops, I deem it my duty, (as a farmer,) to inform them, through the medium of your paper, how to

secure their corn from the ravages of the weevil; which often during the summer and fall seasons, entirely destroys whole houses of corn. As the remedy is so simple, and so cheap, I am in hopes no farmer will leave it untried. It is simply this.—When hauling in a crop of corn, have a mixture of salt and water prepared, (say one pint of salt to a gallon of water,) and as each load is thrown into the house, sprinkle it thoroughly with the salt and water; and it will entirely prevent the insect from breeding in the corn, and likewise cause the husks to be more palatable for stock of any kind. As I know this from experience, I feel no doubt in recommending it to others.

A FARMER.

For the Farmers' Register.

COMMERCIAL REPORT.

[An apology is due to our correspondent X, and to our readers, for the omission of his report for September—which was caused by its arriving after the last sheet had been printed.]

The commercial transactions in Virginia during the month of September, were to a very moderate extent, and those of October have not been as large as usual, the cause of which will appear in the sequel.

The crop of wheat has proved to be so small, that the mills have not been in full operation, except those in Richmond, where a large supply was secured by early contracts. The price has been better supported in Virginia than in other markets, and has not varied materially, the current rates of fair and good quality being from 100 to 105 cents per bushel. The demand for flour for foreign export is confined to South America and the West Indies, and has not been very extensive. The price of grain in all European countries, is unusually low, and the crops in Great Britain are reported to be large and fine—no demand can therefore be expected from that quarter. The stocks of flour in the markets of this State, other than Richmond, are inconsiderable, nor is it likely that they will accumulate. The price of country flour is \$4 75 to \$5, and of Richmond City Mills \$6 25. The supplies to New York from the western parts of that State and the shores of Lake Erie, are very large, and they are annually increasing, with the increased cultivation in, and facilities of transportation from Ohio, Indiana, Illinois, and Michigan, which are becoming the most extensive granaries in America.

The crop of tobacco inspected in Virginia during the year ending 1st October, is ascertained to have been

20,640 hhds. passed.

14,860 refused,

and the stock remaining on hand at that period, was 10,600, showing very little variation in the quantity produced in each of the last three years, but a considerable diminution in the quantity manufactured at home. The export to foreign ports was 15,170 hhds. to Great Britain, 3,530 to France, 6,860 to other markets, chiefly in the north of Europe, being an increase in the foreign export beyond that of the preceding year, of 5000 hhds. The price has been steady, say from \$4 75 for the most inferior, to \$9 and \$10 for fine qualities for exportation. The crop of the present year's growth it is supposed will prove to be somewhat

larger in quantity than the last, and not so good in quality. The quantity of tobacco received at New Orleans (a description which comes in competition with that of Virginia) was 25,000 hhds. being 3,500 hhds. more than in the preceding year, and 5000 less than in 1832.

The crop received at New Orleans, was thus disposed of:

To Great Britain,	-	-	3300
— out ports for orders,	-	-	4800
— France,	-	-	300
— north of Europe,	-	-	4600
— south of Europe,	-	-	950
— West Indies,	-	-	550
— ports in the United States,			10500

The crop of cotton brought to the Virginia markets during the year ending the 1st inst. was 44,700 bales, of which about 35,000 were received at Petersburg. There was exported to Europe, 31,000, to northern ports in the United States 7,500, and 6,000 bales were manufactured in Virginia, as nearly as can be estimated. The crop of the United States which was brought to market during the last twelve months, is ascertained to have been 1,205,400 bales, of which

756,300 were exported to Great Britain,

216,220 to France,

42,760 to the north of Europe,

12,150 to other ports, making a

total of 1,027,430 bales, being 160,000 more than were exported the preceding year, and showing an increase of 135,000 bales in the quantity brought to market. It appears, however, that the quantity manufactured in Europe also increases annually, and that the supply from other countries than this, has rather diminished. It appears that 196,000 bales were manufactured in the United States during the twelve months. The crop produced this year is by many intelligent persons estimated to be even larger than the last, for although an unfavorable season has injured the quality, and diminished the product in the Atlantic States, the great emigration to the south west, and the annual increase of cultivation, more than compensates for a deficiency in the productiveness of any portion of the widely extended territory, of which cotton is the chief staple, and by which the planters are rapidly enriched. The price of the new crop opened at 14 cents in Petersburg and Norfolk, and at about the same in southern markets. It has since advanced to 14½ cents for the best quality, in consequence of reported injury to the Southern and Western crops. The current prices in Petersburg, are from 13½ to 14½. Compared with last year's crop it is much later, and the quality not so good. Very little has yet been brought to our markets: by the 1st of November last year, one-fifth of the crop had arrived.

There has been no pressure for money during the past two months, and little business done in which to employ it, except by dealers in stocks. An advance has taken place in almost all descriptions of State loans and Bank stocks, which may, as regards the former, be ascribed to the rate of exchange on England, where such stock is ultimately sold. The Commonwealth obtained 107 for a loan at 5 per cent. Virginia Bank Stock sells at 110—Farmer's Bank at 108—Exchange on England 107½, being about the relative mint value of gold in the respective countries, when

the pound sterling is estimated at \$4 44, and taking into consideration the loss of interest on bills, an advance of $1\frac{1}{2}$ or 2 per cent. would probably cause an exportation of silver from this country, and a decline would induce an importation of gold.

X.

October 25, 1834.

SERPENTS IN SOUTH AMERICA.

From Humboldt's Travels.

In the savannahs of Izacubo, in Guiana I saw the most terrible spectacle that can be seen; and although it be not uncommon to the inhabitants no traveller has ever mentioned it. We were ten men on horseback, two of whom took the lead, in order to skirt the great forests. One of the blacks who formed the van guard, returned full gallop, "Here sir, come and see serpents in a pile." He pointed out to me something elevated in the middle of the savannah or swamp, which appeared like a bundle of arms. One of my company then said, "This is certainly one of the assemblages of serpents, which heap themselves on each other after a violent tempest; I have heard of these, but have never seen any; let us proceed cautiously, and not go too near."—We continued our way slowly; I fixed my eyes on the pyramid, which appeared immovable. When we were within twenty paces, the terror of our horses prevented our nearer approach, to which however none of us were inclined.

On a sudden the pyramidal mass became agitated, horrible hissings issued from it, and thousands of serpents rolled spirally on each other, shot forth out of the circle; their hideous heads, presented their envenomed darts to me. I own I was one of the first to draw back; but when I saw this formidable phalanx remained at its post, and more to defend itself than to attack us, I rode round it in order to view its order for battle, which faced the enemy from every side. I then sought to find what could be the design of this numerous assemblage; and I concluded that this species of serpent dreaded some colossean enemy, which might be the great serpents, or the cayman, and that they reunite themselves after having seen this enemy, in order to attack or resist him in mass. On this occasion, I shall hazard an opinion which I founded on several other observations; it is that the animals in the new world are more advanced than the men in developing their instinct, and in the social combinations of which they are susceptible; the silence and the solitudes of the woods leaving the greatest liberty to all their motions, the individuals of the same species easily meet and species which are best organized, feel without the impulsion of a common interest which announces and provokes to the same end the concurrence of all their means; but after having acknowledged in animals different degrees of intelligence, such as memory, deliberation, will, we are reduced to mere conjecture as to their means of communication. It is certain, that those which possess the organs of voice have cries of alarm, of rallying, of love, of anger, and may they not also have those requisite to combine in their chases, to distribute the post of attack and defence, the different labors of their common construction, as well as for supplying their common habitations with necessaries.

SHORT-HORN BULL NULLIFIER.

Messrs. D. Galt and H. Edloe, have lately received from England, a fine young bull of the improved short-horn breed. *Nullifier* will be kept in or near Williamsburg: and if he lives, it may be confidently anticipated, that he will prove highly profitable to his owners, and ultimately to the breeders of cattle through that region. No other part of Virginia, east of the Blue Ridge, is better suited for profitable grazing, or more requires a good breed of cattle.

TO CORRESPONDENTS.

The following communications have been received. "On cheat and wheat"—"Gama grass"—"The time to cut tobacco"—"Influence of the moon on vegetation"—"The fence law"—"On the 'cheat controversy'"—"The pleasures of agricultural pursuits"—"Queries &c. by *A Lover of Husbandry*"—"On the food or nutriment of plants"—As the last piece is "to be continued," it is respectfully suggested to its unknown author, that it will be best to send the concluding portion, so that all may appear together. We dislike destroying the connexion of any communication by giving it in detached portions, and never have divided any, unless when the subject properly admitted of it. Besides, it is necessary in most cases that we should see, and have possession of the continuation of an article, before it is promised to our readers. These remarks are applicable generally, as well as to the particular communication which has elicited them.

Several communications "On the season and state of crops" have been received at different times, just after the last sheet of the number was ready for the press, and have been afterwards omitted, because the delay of another month had deprived such reports of their intended use of conveying news. This will of necessity often occur, when such reports arrive after the 25th of the month.

§ A short communication from a correspondent in Amelia, is not sufficiently plain in the directions contained to be understood. A more full statement will be acceptable, and will be published when received.

A letter of inquiry relating to Herd's grass, &c. the receipt of which was acknowledged in the last No. has been mislaid, and its publication thereby prevented. If the writer had not omitted to give his name and address, we should in a more private manner than this, have tendered our apology, and requested another copy for publication.

TO SUBSCRIBERS, AND TO APPLICANTS FOR AGENCIES.

§ No person is authorized as agent for the Farmers' Register, nor will there be, without previous notice being published on the covers. The punctuality of the large majority of our subscribers, so far, has rendered it unnecessary for the great trouble and expense of collecting agencies to be incurred.

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THE FARMERS' REGISTER.

VOL. II.

DECEMBER, 1834.

No. 7.

EDMUND RUFFIN, EDITOR AND PROPRIETOR.

Extracts from the last edition (1833) of the "Complete Grazier."
ON THE BREEDING, REARING, FATTENING,
AND GENERAL MANAGEMENT OF NEAT CAT-
TLE.

[Continued from page 336 Vol. II.]

Of soiling neat cattle.

The advocates of this system support it by the following arguments, which certainly merit the closest attention of the grazier. That:

I. By introducing the practice of soiling, a *very considerable saving of land* will be effected; one acre of cut grass soiled being equal to three acres used as pasture; and one acre of cut clover being equal to two acres pastured, even of the same field, and sown with the same grass, the clover not being trampled upon, and growing so much faster than if it were often corroded with the teeth of an animal, or the young leaves nibbled off before they are sufficiently formed. It has even been affirmed that sixteen acres of cut clover and tares will feed as many horses and cattle as *thirty-six* acres of the same kind of grass would do, if used in pasturage;* and that as all plants draw much of their food from the atmosphere by means of their foliage, they are deprived of their chief support and never attain perfection, if the herbage be trodden before it has arrived at maturity.

II. There is also a *very considerable saving in the quantity of food consumed*, as well as a greater variety of plants eaten, and consequently prevented from running to waste: for when animals are suffered to go upon the field, many plants are necessarily trodden under foot and bruised, or partly buried in the earth; in which state they are greatly disrelished by cattle, and are suffered to run to waste; a circumstance which never could occur, if the practice of cutting were adopted.

And if the consumption of plants be the object principally regarded, it is obvious that the benefits thence to be derived will be very great; for experience has clearly proved, that cattle will eat with avidity many plants, *if cut and given to them in the house*, which they never would touch while growing in the field: such are the dock, cow-parsley, thistles, nettles, and numerous other plants; yet, on the other hand, it is known that they will eat food, *when thrown to them on the ground*, which they will reject when given in the stall. We confess, we know not to what circumstance this can be attributed; but the fact is, that the animals will eat them without exhibiting any marks of dislike or reluctance, even when they are not pressed by hunger; and they often greedily devour

these plants as soon as they are brought in from the field, and before they can have possibly had time to become hungry. It is also well known that many of our best and finest grasses, which, when young, form a most palatable food to cattle, are, if once suffered to get into ear, so much disliked by them, that the beasts will never taste them unless compelled by extreme hunger. And as, in most pastures, many of these grasses ripen through delay, their produce is, of course, inevitably lost to the grazier; whereas, if cut down by the scythe in proper time, not one plant will be suffered to get into that nauseating state, and consequently no waste can be sustained from this cause.

In addition to the preceding observations, it may be remarked, that those few plants which are totally disregarded by one class of animals, so as to be rejected by them, even in the house, will not, on that account, become less acceptable to others, but greatly the reverse. Thus grass, or other food, that has been *blown or breathed upon* by any animal for a considerable time, becomes unpleasant to other beasts of the same species, but not so to stock of another class or variety; for them, indeed, it appears to acquire a higher relish. Even greater defilement by one animal seems to render food more acceptable to others; for straw, which in a clean state has been refused by cattle, acquires such a relish, if employed as a litter for horses, that they seek for it with avidity. Hence it happens, that the sweepings of the stalls from one animal supply a pleasing repast for those of another kind, which can be easily removed from one to the other, if the plants are consumed in the house, but which must otherwise have been lost in the field. And this peculiarity may, as we shall shortly have occasion to show, be employed to answer another useful purpose.

III. With regard to the influence produced by soiling on the *health and comfort of cattle*, the balance is conceived to be clearly in favor of the cutting system, when compared with that of pasturing. Thus, they are not liable to be blown or hoven, or to be staked or otherwise injured by breaking fences; and it is well known that when animals are exposed to the sun, in the open air, they are not only greatly incommoded on many occasions by the heat, but are also annoyed by swarms of flies, gnats, and hornets, which, as well as the terrible *gad-fly*,* drive them into a state of perturbation little short of madness, that obviously tends to impede their thriving. At other times they are hurt by chilling blasts, or drenched by cheerless rains, which retard their feeding. Under proper management, in well constructed stalls, all these evils would be alike removed, and they would be kept in a uniform state of coolness, tranquillity, and ease, so as to make the same quantity of food go farther in nourishing them than it otherwise would have done. Lastly, by judiciously mingling green and succulent vegetables with dry

* Sinclair, vol. II p. 19. An experiment is recorded in "the American Farmer," (vol. II.) from which it appears, that seventeen acres of land, under the soiling system, supported as much stock as had previously required fifty; and Sir John Sinclair mentions a singular coincidence in another trial, in which thirty-three head of cattle were soiled, from the 20th of May to the 1st of October, 1815, on seventeen acres and a half, of which fifty were necessary in pasture. Code of Agriculture, p. 487.

* The *Oestrus bovis* of Linnæus, sometimes called the *breeze*.

and nourishing food, as circumstances may require it, and by varying the different articles so as to provoke an appetite, not only the health, but also the thriving of the creatures will be greatly augmented beyond what they could have been by any other mode of treatment.

IV. The proportioned increase of manure obtained by soiling and stall-feeding, further evinces their superiority over pasturing. *Manure* is the life and soul of husbandry; and when tillage is an object of attention, there can be no comparison between the two modes of consumption, especially with regard to the manure obtained by soiling live-stock, during summer, with green food; for, in consequence of the increased discharges of urine during that season, the litter, of whatever substance it may consist, is speedily converted into dung. And there can be no doubt, but that the quantity of manure made during the summer may, by constructing proper reservoirs for the reception of the stale, and by throwing this at leisure times over the litter, be made to equal, if not exceed, the produce of the dung accumulated during the winter. The quality must depend on the nature of the food.

V. With regard to the quantity of herbage afforded from the same field, under the cutting or grazing systems, the balance will be found equally in favor of the former. All animals, it is well known, delight more to feed on the young and fresh shoots of grass than on such as are older. Hence it invariably happens, that those patches in pastures which happen to have been once eaten bare, in the beginning of the season, are kept very short throughout the remainder of that season, by the animals preferring them to other parts of the field where the grass is longer; so that the latter are often suffered to continue in a great measure untouched. Another circumstance, however, which is not very generally known, is, that grass—even the leafy parts of it—when it has attained a certain length, becomes stationary; and, notwithstanding it will retain its verdure in that state for some months, yet, were it cut, it would have continued in a constant state of progress, proportioned to the frequency of its being cropped.* Experiments have, indeed, been brought forward to prove that with clover, rye-grass, lucerne, and tares, double the number of cattle may be supported in much better condition when cut than when pastured; and from the results of other trials, it appears to be equal to five, or even a larger number. Many exaggerated statements have, indeed, been produced in support of the system of soiling; but, without attaching implicit faith to these, we are convinced, from actual observation, that, by judicious management in this respect, the profits of the grazier may be largely augmented.

The practice of soiling and stall-feeding cattle has been adopted, to a considerable extent, on the continent, by Baron von Bulow and others; the result of whose experience is inserted in the first volume of the "Communications to the Board of Agriculture," by Dr. Thaër, physician to the electoral court of Hanover, and which, he ob-

served, has proved the following facts to be incontrovertible.

1. "A spot of ground which, when pastured upon, will yield sufficient food for only one head, will abundantly maintain four head of cattle in the stable, if the vegetables be mowed in proper time, and given to the cattle in a proper order.

2. "The stall-feeding yields at least double the quantity of manure from the same number of cattle; for the best and most efficacious summer manure is produced in the stable, and carried to the fields at the most proper period of its fermentation; whereas, when spread on the meadow, and exhausted by the air and sun, its power is entirely wasted.

3. "The cows used to stall-feeding will yield a much greater quantity of milk, and increase faster in weight, when fattening, than when they go into the field.

4. "They are less subject to accidents, do not suffer by the heat, by flies and insects, are not affected by the baneful fogs, that are frequent in Germany, and bring on inflammations; on the contrary, if every thing be properly managed, they remain in a constant state of health and vigor."

The facts and inferences above stated fully prove the advantages of soiling. It ought not, however, to be concealed, that there are some inconveniences attendant on the soiling and stall-feeding of cattle; such as, for instance, the additional labor and expense incurred by cutting and carting the green vegetables home to sheds, both in winter and summer. But these are compensated, in a tenfold degree, by the increased value of the food, the thriving of the cattle, the making of the dung under cover, and having reservoirs in which to catch the urine. With this management, one good acre of turnips will produce an excellent dressing for at least an acre of land, and with a very small portion of hay, will completely winter-fat an ox of fifty score. If fed on the land, two acres of tolerable grass may fat an ox, but not so well, nor will he be forwarded so fast in flesh, if exposed to the weather in cold and wet seasons, as if kept dry and moderately warm; and the dressing will be very partial and precarious. Further, where large quantities of food are accumulated together for a considerable time, it is objected, that they are liable to fermentation, and of course to waste; such are cabbages, turnips, and other roots; so, where tares are left on the ground, they are liable to become podded, in consequence of the butt-ends of the vegetables being of a coarse nature, and in a decaying condition, in which state they are uniformly refused by beasts. But these, and many other disadvantages that might be mentioned, may be obviated by paying due regard to the storing of the various vegetable crops, and to their economical consumption. It has likewise been objected, even by persons who in general approve of soiling and stall-feeding, that cattle will, by confinement during the summer months, be too much heated, and that their health will be affected; but stalls may be so constructed as to admit a regular circulation of air, and yet shelter them from the attacks of flies. The cattle may also be allowed the freedom of an open yard. Indeed, in that season, fold-yards, with open sheds, are much to be preferred to stalls. This is the practice in Yorkshire, where the management of stock is well understood; and there are not wanting many ex-

* See Dr. Anderson's Essays on Agriculture, &c. Vol. II. Disquisition V. where this interesting fact is corroborated by experimental proofs, which our limits forbid us to introduce.

perienced graziers who prefer air during the utmost inclemency of winter. Air is, indeed, indispensably necessary to the preservation of the health and the speedy fattening of animals; for, if kept too hot, they will perspire profusely, and their hides will itch; this vexes them exceedingly, and necessarily retards their quick feeding, yet some very eminent graziers have pursued this plan with considerable success.*

When grass (whether natural or artificial) is to be given, it ought to be cut in the morning for the evening food, and in the afternoon for the morning; the afternoon crop should be carried to the barn, or some other convenient place, and spread out in order to exhale its superfluous moisture; and, in rainy weather, both crops must be taken off the ground. Attention, however, ought to be paid to the due proportion to be cut; and, until that fact be ascertained, it is a good plan to measure each mess, and to chalk down the quantity in weight, which the basket, cart-body, or other vehicle employed for carrying food, contains of the various articles used for that purpose. The practice will, at least, have a tendency to teach farm-servants to observe method, the value of which is of considerable importance in all business, and in none of more than in the various branches that are connected with husbandry. In the early part of the season, when tares and clover are either inadequate to the support of the stock, or that it may be thought expedient to change them gradually from dry to green food, a portion of these grasses may be mixed with the hay or straw on which the cattle are fed; and, if the mixture be made up over night, the dry provender will be found to have acquired a sweet vegetable taste, and to be rendered so moist and palatable as to be more readily eaten.

As the various grasses peculiarly calculated for grazing or soiling cattle, will be particularly detailed in a subsequent Book,† we proceed now to state a few of those articles which have been found most useful for the purpose of winter or stall-feeding, or of feeding in the farm yard.

Of stall-feeding neat cattle.

This branch of the grazier's management begins towards the end of October, and lasts for about seven months, that is, till the commencement of May. Of all vegetable productions, good hay is undoubtedly the best for fattening cattle, though such hay, except on the most luxuriant soils, will rarely be found capable of fattening animals when finishing off for the market, unless judiciously combined with cabbages, carrots, parsnips, turnips, or similar succulent plants; or oil-cake. Barley, rye, oat or pea-meal, if mixed together, in about equal proportions, with the occasional addition of a small quantity of bean-meal, may likewise be given with advantage, in the ratio of a quarter, or at most half a peck, to each head of cattle, in conjunction with cut hay, if the price will admit. Of the last-mentioned article it may be observed, that the hay made from grass mowed after the cattle, is usually employed for feeding live-stock at the beginning of winter; the best being reserved for the spring; and where a

handful of salt has been thrown over each load, when stacked, so grateful is this to them, that they have been known to prefer poor hay *salted* to good hay *unsalted*. Salt acts as a condiment, which appears to assist the digestion; and, from the avidity with which ruminating animals eat it, nature seems to have intended it for their benefit.

One of the most luxuriant of all vegetable productions is the cabbage with its numerous varieties, which, when combined with cut pea or oat straw, has been found singularly useful as winter fodder for store stock; and which, with the addition of good hay, will fatten oxen or bullocks in the short space of five months, besides yielding a larger quantity of manure than almost any other article used for winter feed.

Parsnips have been employed not only for feeding store cattle, but particularly for fattening oxen, which eat them with great appetite; the benefit thence derived being, in the estimation of some graziers, nearly equal to that obtained from oil-cake: but they are apt to cloy the appetite, and should therefore be given with other food, or if alone, they should not be continued for a long time together. In Jersey, where they are largely used as food for all animals, bullocks are fattened on them in three months. The flesh is considered superior to any other beef, and commands an additional price. To hogs, they are given at first raw, and afterwards boiled, or steamed, and during the last fortnight with bean or oat-meal. The animal is thus sufficiently fattened in about six weeks; the flesh is more esteemed than that produced by other means, and is said not to waste in boiling.*

Next to parsnips we may class the carrot; a most useful root, the produce of which is so abundant that, according to an account of Mr. Young, four bullocks, six milch kine, and twenty work-horses were fed, a few years since, at Partington, in Yorkshire, for about five months, with carrots, the produce of three acres, with no other addition than a little hay throughout that period. He adds, that the milk was excellent in point of quality and flavor; and the refuse or waste, with a small quantity of other food, fattened thirty swine.†

Mangel-wurzel comes next in order in feeding cattle: indeed, in some late experiments it has been found superior to carrots, and nearly equal to parsnips.‡

Turnips, especially Swedes, also supply a nutritive article of winter food; though, from their peculiarly moist nature, they require to be combined with cut hay, to which a little barley or oat-meal may occasionally be added.

* Quayle's General View of the Norman Isles.

† This is one proof, among many, of the vague manner in which experiments are often related, and consequently of the little reliance to be placed on them, when all the details are not accurately stated. Without at all meaning to depreciate the value of carrots, the excellence of which, as food for cattle, is now universally admitted, it cannot escape observation, that they must, in this instance, have been accompanied by no small quantity of hay; for only allowing one bushel of carrots per day, to each beast, the quantity would amount to 4500 bushels, exclusive of the swine; that is, 1500 bushels per acre, or about three times the amount of a good crop.—ED.

‡ For an analysis of the different roots and grasses, see Book IX. Chap. VI.

* See the following Chapter.

† Book IX.

In the county of Norfolk, however, which has long been celebrated for its turnip husbandry, there are very great numbers of cattle annually fattened for the London market, on little other food than turnips, which are given to them *whole*, and in a raw state; and it rarely happens that any animal is choked, or otherwise injured, by roots sticking in the throat. When this accident occurs, the practice is to pour a horn full of salt and water down the beast's throat; and in case that does not succeed, a similar quantity of *salt and melted grease*, such as hog's lard, or any common grease, or oil, is used, which preparation has rarely been found to fail of procuring relief to the animal in danger of suffocation.

The Norfolk method of *turnip-fattening cattle* is threefold:—according to the *first plan*, the roots are thrown on stubbles, grass lands, and fallows, to cattle abroad in the fields. This is the prevailing practice, a great part of the cattle fed in that district being fattened abroad: it requires the least attendance, and is allowed to be beneficial to light lands.

The general practice in the county of Norfolk is, to begin with the wheat stubbles, on which turnips are usually thrown, till they are broken up for fallow or barley. The next *throwing-ground* is frequently the barley stubbles, which receive the bullocks, (i. e. fattening and fatted cattle,) as the wheat stubbles are scaled in, and retain them until they are, in their turn, broken up for a turnip fallow. From Christmas till early in April, the clover leys only are thrown upon: and after these are shut up, in order to acquire a bite of grass for the unfinished bullocks, the turnip fallows sometimes become the scene of throwing.

Occasionally, however, the farmers deviate from this mode; some objecting to the throwing of turnips on land intended for those roots the following year, under the apprehension that it produces the disease termed *anbury*.† In this case the clover leys succeed the wheat stubbles, some part of them being kept open till the turnip crop is finished in the spring. Sometimes young clover fields are thrown open; but this is regarded as bad management, unless the season is remarkably dry, and the surface of the earth is perfectly sound; nor is it often done unless there happens to be no clover stubble in the vicinity of the turnip piece.

But though the soil of Norfolk is, in general, very dry, the farmers of that district are sometimes inconvenienced, in wet seasons, for clean ground on which to throw their turnips; and notwithstanding the value of *teathe*,‡ when the land will bear the bullocks, instances have occurred where farmers have requested their neighbors to allow them to throw turnips upon a contiguous

piece of old ley-ground, or *olland*, as it is there called; preferring the loss of the teathe to checking his bullocks. On this account, therefore, Mr. Marshall recommends, in laying out a farm upon the Norfolk plan, so to intermix the crops, that there shall be at least two pieces of ley in the neighborhood of each piece of turnips.

The turnips are thrown on the land in the following manner: a cart enters on one side of a close, in which stands a boy, who, as the vehicle is going regularly to the other, throws the roots out, with their tops and tails on, as they are drawn out of the ground; giving every part an equal share, and never throwing twice in the same place, until the whole has been gone over. In the commencement of the throwing season, while there is yet an abundance of grass for lean stock, the usual practice is, to keep the fattening beasts constantly in the same piece of wheat stubble, a fresh supply of roots being given to them every day, or every second day at farthest.

When the clover stubbles are cleared from grass, and the store cattle begin to require assistance from the turnips, the fattening cattle have *followers*, i. e. rearing cattle: lean bullocks, cows, or store sheep follow them to pick up their refuse. In this case it becomes convenient to have three *shifts*, or three pieces of throwing-ground in use at the same time: one allotted for the head beasts, another for the followers, and a third plot empty, for the purpose of throwing turnips on it. Two pieces, or at least two divisions of the same piece, are indispensably necessary; and sometimes a row of hurdles is run across a throwing piece, in order to separate the bullocks from the followers.

In throwing turnips, it is of great importance that they be thrown *evenly and thinly*, so that while a beast is breaking up one root, he cannot have it in his power to trample or dung upon another. But sufficient precaution is seldom taken to guard effectually against this inconvenience—though if turnips are cast at the distance of one yard asunder, they are not ill thrown—as they are too often dropped in rows, or clusters, of half dozens together.

Bullocks, which are fed on turnips abroad, are sometimes driven into the straw yard at night, where the distance is not too great; and, occasionally, a little straw is given them under the hedge of the throwing piece, when they continue entirely abroad. The quantity of straw thus consumed is very trifling, the object of it being merely to cleanse their mouths from the dirt of the turnips, on which root alone the farmers place all their dependence for bringing their cattle forward; though there can be no doubt that the straw is also materially useful in correcting the too abundant moisture of the yellow turnip.

Mr. M. remarks, it as an interesting fact, that not one in ten of the highly finished bullocks, which are annually sent to Smithfield out of Norfolk, taste a handful of hay, or have scarcely any other food whatever than turnips and barley straw, excepting such as are fattened off in the spring with ray-grass; and a few that are fatted by superior graziers, who make it a point to give a little hay to their bullocks at turnips, towards the spring, when those roots are going off, and before the grass-leys are ready for their reception; an excellent practice, which ought, if possible, to be generally adopted, as without such precaution bullocks

* Marshall's Rural Economy of Norfolk, vol. i. p. 287.

† The nature and probable cause of this affection in turnips will be stated in Book IX. Chap. V. Sect. I. where the culture of those roots is discussed.

‡ "This is an important word in Norfolk husbandry, for which our language has no appropriate synonym: it denotes the fertilizing effect of cattle upon the land on which they are foddered with any kind of food; whether such fertilizing effects be produced by their dung, their urine, their treading, or by their breath, perspiration, and the warmth of their bodies."—Marshall's Norfolk, vol. i. p. 34.

are liable to be checked in their progress between turnips and grass. The cattle usually fatted in Norfolk are Scots; instances however have occurred, though rarely, in the county of Essex, in which Northumberland beasts, of the largest size, have been fattened on *turnips alone*, without the aid of any other food.

The *second method* of giving these roots to cattle is by means of close bins, or small cribs, with boards or bars nearly close at the bottom, while the beasts are kept in a loose straw yard. These bins are dispersed over the yard, and the turnips are put into them *whole*; the tap-root, and also the tops, unless they are fresh and palatable, being previously cut off, so that the fattening animals receive only the bulb; the tops, if eatable, being consumed by store cattle.

While the bullocks are in the yard, they have the straw sometimes given them in cribs, and at others it is scattered in small heaps about the yard, twice or thrice in the day; the quantity thus eaten is very trifling, and with the last-mentioned management, the yard becomes evenly littered without further trouble.

The mode of fattening here detailed is attended with somewhat more labor than the preceding method of throwing turnips abroad, which, in Mr. Marshall's opinion, is the preferable management, if the soil be sufficiently dry to support stock, and light enough to stand in need of being rendered firm by treading. On the contrary, where the land is deep, and the season is wet or severe, the straw-yard is the more comfortable place, provided it be kept dry and well littered, and be furnished with open sheds, in which the stock can shelter themselves; for, though the teathe of fattening cattle abroad is greatly beneficial to light soils, yet if bullocks, while fed in the yard with turnips, are well littered, they will make a large quantity of excellent manure, that will amply compensate for its loss.

The *third method* consists in keeping the cattle tied up in hovels, or beneath open sheds, with mangers or troughs for receiving the turnips, which, in this case, are frequently *sliced*, or more generally (though perhaps less eligibly) cut into quarters by means of a small chopper, upon a narrow board or stool, beneath which is a basket for catching the pieces. In this operation the turnip is held by the top, which, when wholly disengaged from the root (except the coarse part immediately about the crown) is thrown aside for the store cattle. The tap root and bottom rind are separated with the first stroke, and suffered to fall on one side of the basket, so that the fattening animals have only the prime part of the plant, with which they get a little hay, or barley straw. In this manner they generally make the quickest progress in fattening, especially in cold weather; but, from its increased trouble, it is confined chiefly to little farmers, who have opportunity to tend their own sheds.

From the preceding facts and statements, Mr. Marshall conceives an eligible plan of management may be adopted, where circumstances will admit of it. In autumn, therefore, while the weather continues moderate, the bullocks may be allowed to remain abroad: but whenever it sets in very wet, or becomes intensely severe, they should be taken and kept under shelter, either until their fattening be completed, or the warmth of spring

again invites them abroad. The whole plan is at variance with that of regular stall-feeding, which is founded on the principles of accumulating dung in the heap, and of keeping the cattle in an equal state of warmth; which latter point is generally considered essential to their improvement in flesh. It will, however, be observed, that the Norfolk system combines the improvement of the land with that of the beast; an object which is much promoted by the treading of the animals on the light soils of which that county is chiefly composed. It must also be admitted that many experienced graziers are adverse to stall-feeding, as being prejudicial to health.

Many instances could, however, be adduced in which stall-feeding has been successfully carried to the opposite extreme of heat and confinement. Among others, two are mentioned by the late Arthur Young: the one, in the practice of a very fortunate grazier, Mr. Moody, of Retford, who found warmth of such consequence, that he gradually closed the air-holes of the building, provided with sliders on purpose, till his beasts sweated off the hair, and they did not thrive to his mind until this happened: the other, in a similar system pursued on the farm of Mr. Hanbury, of Coggeshall, who considers it essential to keep the beasts as warm as possible; and that even if it brings off the hair, they thrive the better, and will feel the better at Smithfield.

Mr. Young, whose opinions on agricultural subjects, though sometimes too speculative, are, from his great experience, entitled to the highest respect, was decidedly in favor of warmth; and both on that subject, and on the general slowness of farmers to adopt improvements, he thus strongly expressed himself:—"men farm without an idea of any necessity of knowing what others have done before them; nay, they encourage themselves in ignorance, by a pride of rejecting book husbandry; and it is very right that thousands of pounds should have been lost by oil-cake feeding shivering beasts in open sheds, by men who think they can learn nothing beyond the practice of the old women their grandmothers; while the Board of Agriculture is annually bringing to light, in county reports, practices unknown to the very men who cannot see any use in such publications: but ignorance is its own punishment."*

To return from this digressive account of the Norfolk turnip-management, the importance of which, we trust, will be a sufficient apology for its length:—Lastly, among the various vegetable productions that have been appropriated to the stall-feeding of cattle, none have occasioned greater discussion than *potatoes*. They furnish an excellent supply, particularly when cut and steamed;† and from the subsequent facts, they appear adequate to the fattening of neat cattle, in combination with a comparatively small portion of other food. In the eleventh volume of the "Annals of Agriculture," we meet with the following statements relative to these roots, by Mr. Campbell, of Charlton, in Kent, an able and successful grazier, in answer to some queries that had been proposed to him by Mr. Young. He observes, that 100 bushels of potatoes, and 700 weight of hay are generally sufficient

* Survey of Essex, 1813. Vol. II. p. 304.

† For a simple steaming apparatus, see Book VII. Chap. XI.

to fatten any ox that thrives tolerably well. The roots should, at first, be given in small quantities, which should then be gradually increased to one or two bushels per day; dry food being always intermixed, and the proportion of hay being uniformly regulated by the effect which the potatoes produce on the bowels. There ought to be at least *five servings* in the day; and according to the quantity of roots which a beast can be induced to eat with appetite, he will fatten the sooner, of course with less expense and more profit. The hay should be cut once, or if it be not very weighty, twice along, and three times across the truss, so as to be in square pieces of eight or ten inches, in which state the cattle will eat and digest it more readily, while their fattening is considerably expedited. The potatoes, however, according to Mr. C., need not be cut, except at first, in order to entice the beasts to eat them; but they ought always to be *fresh and clean*. No corn or meal is necessary; but if it can be procured at a moderate price, it would contribute materially to facilitate, and of course to render more profitable, the whole system of cattle-feeding. Should a *scouring* be brought on by the use of raw potatoes, which often happens, the quantity of meal or other dry food given them should be increased, until the beasts become accustomed to the roots, when this inconvenience will cease.

Potatoes, however, being an article of constant consumption in our markets, are more subject to variations of price than any of the other roots commonly used for fattening cattle. The grazier must, therefore, be governed by the consideration of their comparative cost, as well as quality. The cultivation of potatoes is also expensive; and there is a general impression (whether well founded or not, it is not our present purpose to inquire) that they exhaust the land; in consequence of which, they are seldom resorted to as a fallow crop, even on soils best adapted to them, while in some of the best grazing districts the ground is too strong and heavy for their growth. It should also be remarked, that when given raw, during a long time, they have been frequently found prejudicial to the health of cattle: the cause has not been ascertained, but it may, possibly, be owing to the poisonous quality known to exist in the juice of the root. When given *steamed*, it has been found an improvement to combine them with Swedish turnips: the turnips being *boiled*, and the juice given with the *dry* potato.

In some districts where winter food is with difficulty procurable, it appears that *heath* may be advantageously resorted to. In a paper on this subject, communicated to the Board of Agriculture by James Hall, Esq., he states, that in the course of numerous experiments on furze, broom, rushes, bean-straw, and other neglected articles, he had discovered, that, if heath be cut when young and in bloom, and the finer parts be infused in hot water, it produces a liquid very grateful to the taste, well flavored, and extremely wholesome. Being anxious to know how far young heath might be useful to cattle, he tried the experiment on a cow. When first tied up, she refused to eat any of the heath, except the very finest part, nor did she appear to relish an infusion of it when set before her: hunger, however, compelled her first to drink the infusion, and then to eat the heath; and on this food only she lived for nearly a fortnight, during which

her milk was reduced in quantity, though its quality was much improved. A similar experiment was made on a couple of sheep and an old horse, with nearly the same effect. As food for sheep, indeed, it forms the chief portion of their sustenance on mountain pastures during the latter part of autumn, and the beginning of winter. Satisfied from these experiments, that cattle may be supported for a long time by young heath, Mr. Hall proceeded to ascertain how far the plant was capable of retaining its valuable qualities when dried and laid up. He therefore cut some at the end of the summer, and dried it in the shade; and, at the end of two years it produced an infusion equally strong and well flavored as at first; and the effect was the same at the end of three years. Young heath may be procured by burning the old which remains on the ground; the ashes afford an excellent manure, and generally cause a fine young crop to spring up, which will afford a bite for the flocks in the ensuing months of August and September. This, it is also said, may be cut for hay at two or three years old, and given to cattle when fodder is scarce; and that when intended for this purpose, it should be carefully stacked and kept close, otherwise it will become less valuable;* but, in a late very intelligent account of the husbandry of the county of Sutherland, by Mr. Patrick Sellar, published by the society for the diffusion of useful knowledge, in their "Farmer's Series," no mention is made of this latter application of heather, though he describes its uses for sheep, when eaten on the ground, and states the great difficulty of providing them with food during part of the spring; and, as it is not probable that so obvious a mode of supplying that deficiency would have escaped observation, we may conclude that it has been tried, and not found to answer the purpose.

Fir-tops, or the young and tender shoots of fir-trees, have likewise been employed with effect in a case of emergency, as a substitute for other articles of winter fodder. Of this circumstance we have a striking illustration in the fifth volume of the "letters and papers of the Bath and West of England Society," where a correspondent states, that, being in great want of provender, and having scarcely any hay, he was compelled to feed his beasts on fir-tops, and though he had more than four hundred head of neat cattle, yet he did not lose above four or five out of that number; while many graziers, farmers, and breeders, who reside in the same county, lost one-half, and several of them nearly the whole of their live-stock.† We state this fact, as it was communicated to the respectable society above mentioned; and would recommend attentive experiments to be farther made with this vegetable production, as, in the event of a scarcity of winter provender, it promises to be a salubrious substitute for more invigorating food, which might in a short time be collected, and prove eminently useful in cases of emergency.

[To be continued.]

* Communications to the Board of Agriculture, Vol. VI. Part 2.

† They have also been used by Mr. Coke, at Holkham, with considerable advantage.

THE FENCE LAW.

To the Editor of the Farmers' Register.

I am glad to see that attention is directed to the law of enclosures, as it at present exists. On this subject a good beginning may be made in the legislature of Virginia, to encourage agricultural improvement. The law as it is at present, is certainly not a wise one. It is oppressive in its nature, and detrimental to the interests of agriculture. Could not some one go back to the date of that law, and by detailing circumstances, throw some light on this subject?

As the law at present stands, the careless farmer is made the assailant, while the judicious farmer, wishing to practice economy, is made the assailed. Let an example be adduced. Let us suppose two farmers, whose lands join. The one comes in possession of his farm, as an inheritance from injudicious ancestors, who previously to his taking possession, and very likely before he was born, had cut most of his rail timber, leaving him not enough to enclose all his open land, and scarcely sufficient to erect a "lawful fence" around his cultivated fields. His more fortunate neighbor has an abundance of timber to enclose the whole of his farm with more than a lawful fence. The latter can turn his stock out, and what is the consequence? It must be at once obvious. The scanty farm, or a great part of it, becomes a pasture for his neighbor's stock. The first farmer's unenclosed land will be picked clean, while at the same time he lives in constant dread, that his fence will not prove for his crop a barrier to their encroachments. Thus, the unenclosed land is impoverished by his neighbor's cattle. But suppose the last be required to keep his stock on his own land: the out-land would rest, and become rich. This is but an example of thousands of instances all over this State; thus presenting Virginia, as one large common, like the fabled giant in the ancient hell, whose liver is ever devoured by dogs, but never completely destroyed. What would be the result if every farmer was required to keep his stock on his own land? Their out-lands would improve, because they would be as enclosed lands. The number of stock would be lessened, while the quality would be improved. Soiling would be commenced; and the good effects of not having out-lands grazed, would soon prove to the farmer that his cultivated lands should not be grazed, and that he would gain more by letting his grass enrich his lands, than by permitting his stock to eat it, or tread it down.

Could these happy results be realized, what a change would be effected in Old Virginia. I should like, sir, to see an estimate made of the number of acres of unenclosed land now in Virginia, which is left the prey to strolling cattle. I have not the data by which any estimate could be made. If some tolerably correct account could be given, it might serve to awaken more attention to this subject. How frequently, in passing over the county, do we see farms from some cause or other, deserted, with fences down, the prey of every man's cattle! Farms in the neighborhoods of villages frequently suffer much in this way. As the law at present exists, one man is required to keep his neighbor's stock off of his cultivated lands, while they may legally run on his out-land. As it should be, every man should be required to keep

his stock on his own land, and off of his neighbor's. In a provision of this sort, the dimensions of the fence might not be mentioned. This the owner could best judge of. One obvious result would grow out of this provision; the same fence would more frequently be made to serve two neighbors, and in this way, bones of contention would be removed. Instead of each leaving unenclosed lands between them, one fence, would be on the line. But I leave abler pens to point out the many good results of such a provision. One more thought, and I am done. Laws to be obeyed, must tend to promote the interests of all, or a *decided majority*. The law as it now is, is detrimental to a majority—and its breach tends to the direct interest of not a few. Take the example first cited. If A, who has the good fence, is not the man he should be, he cares not how much B's crop is injured. He might be even tempted to throw down a tottering rail, or to leave a gap. The law, as it should be, would be to the decided interest of a majority. B would soon have the law on A, if he did not keep up his stock. And the fact that neglect on his part would tend directly to his injury, would make him careful. The old English law on this subject was very strict: forfeiture with heavy damages.

If the legislature will not adopt the recommended provision, surely the palpable evils of the present law will demand a repeal. But, sir, may we not look for better things from the legislature of Virginia? Will not men consult their *own interest*? A bright day is dawning on Old Virginia, if her patriotic sons who represent her interests, will make the move. Certainly many members of the present legislature, read your valuable journal. Some, I know, contribute to its columns. Will they direct their first attention to this point? It is a good subject for a beginning. They may take a burden or a grievance off, if they will not confer a direct benefit. Your public spirited correspondent well remarks, that next to "general education," this subject demands the most attention. This was well said: and agricultural improvements require aids to be effected just as the mind requires systems of education." God speed the day when the genius of education shall shed her mild but brilliant light over every part of our beloved State, leaving no "corner" where ignorance with her "hideous crew," may dwell, the ready handmaids of rampant ambition, or arch deception—and when agriculture will present a "smiling land."

T. B. MCR.

Retirement, Prince Edward.

INFLUENCE OF THE MOON ON VEGETATION.

To the Editor of the Farmers' Register.

An opinion prevails to a considerable extent, that the moon has an influence on the weather: that is, that changes of weather are more likely to occur about the full, quarters, and change of the moon, than at other times. On this subject many observations have been made, and a number of essays written, *pro* and *con*, but without settling the question.

Another opinion, the influence of the moon on vegetation, though less common, is more firmly believed in and acted on by those who embrace it, than the other. I do not, however, recollect to have seen any thing in print on this subject.

The Dutch generally, and a good many others, believe that the growth and perfection of vegetables depend, to a considerable extent, on the state of the moon at the time of planting or sowing their roots. Such as potatoes, turnips, beets, &c. &c., should be planted or sowed on the decrease, and wheat, peas, &c. on the increase of the moon. They also believe that pork and beef should be slaughtered before the full.

In the year 1833, the following experiment passed under my observation. Three days before the full moon in March, two rows of Irish potatoes were planted, and two weeks after a further planting was made, to some extent; the soil, seed, and preparation being the same. When potatoes were expected for use, the first planted were not larger than peas, while the second were as good as expected—became very fine, and in the course of the summer ceased to grow, and the tops died. The first planting grew to a great length, (one plant measured eight feet ten inches,) and continued green till frost, when they were dug, and produced about a third, possibly half as much as first planted. I have at other times had potatoes of similar character, but did not attend to the state of the moon. Many farmers, no doubt, have observed that their crops of wheat, corn, &c. or part of them, sometimes turned out worse than from the nature of the soil, and other circumstances, they expected. Still I admit that it requires many experiments made with accuracy and judgement, to establish, beyond doubt, the existence of such a principle: and although the Dutch who universally believe and act on it, are notoriously more successful than most others, yet it may be that this success is the result of more careful tillage.

If such an influence does exist, it is important to the interests of agriculture that it be satisfactorily established. As radishes are of quick growth, an experiment might be easily made, and repeated as often as necessary, by sowing a few seed every week for four or eight weeks.

It is to be hoped, Mr. Editor, that you, or some of your intelligent correspondents, will be able to give us some light on the subject, and let us know whether it is any thing more than "a mere matter of moonshine."

AN INQUIRER.

CHEAT AND WHEAT.

To the Editor of the Farmers' Register.

In looking over the Farmer's Register, I have been struck with the readiness with which some of your correspondents gave into the notion, that a certain portion of their wheat was transmuted into cheat, upon what I consider to be very insufficient testimony. Sometime in the month of May or June last, I had occasion to leave home for some days, and when I returned, on inquiring of my overseer how the wheat crop came on, he, in a most desponding tone, informed me that the prospect was very bad—"that all the wet places had turned into cheat." I laughed heartily at him for entertaining such a notion—for I had always thought it absurd. I went to examine, and somewhat to my surprise, found that in those parts of the field which had not been properly drained, the wheat had entirely disappeared, and nothing but cheat remained. I did not infer, however, that the wheat

had turned into cheat, but that the wheat had been destroyed by too much wet, and that the cheat, being a hardy plant, had survived, and having nothing to interfere with it, had grown very vigorously, so as to cover the ground. I at once instituted a strict examination, and found that the cheat was very much mixed throughout my crop. There were as many plants in the most vigorous parts of the wheat as in the wet spots; but the wheat being more vigorous, either concealed the cheat, or checked its growth, so that it could not be as distinctly seen. I never have believed that wheat changes its essential quality so far, as to become another plant, of a totally different nature. Many experiments have been tried to establish the fact—but none that have come to my knowledge, have been satisfactory. When I first took possession of the farm on which I live, the cheat was growing on various parts of it. It has rapidly increased, so as to become a serious evil: but I can account for its increase on principles much more rational than that of its originating from the wheat. I have known the fact that it existed in my seed wheat from the first, and that it has gradually increased; but I am well satisfied its increase has been owing to my using seed thus mixed with cheat. The cheat grows very luxuriantly in various parts of my land. It is not destroyed by rest, nor by cultivation. It will spring up for years on the same spot, and it would be matter of surprise, if it did not mix in the wheat crop. Give me seed free from cheat, and land where cheat has never grown, and I have no fears that cheat will show itself in the crop; but let the seed once get among your wheat and it will never be eradicated until some more efficient mode of cleaning is resorted to.

A.

THE TIME TO CUT TOBACCO.

To the Editor of the Farmers' Register.

In the last number of the Register I find a communication on the subject of the management of tobacco, signed "Wardsfork," in which the planters are cautioned against letting their tobacco get thoroughly ripe. Whilst I cannot pretend to set myself up as a guide to the distinguished planters of Wardsfork generally, I doubt not, a large majority of them will bear me out in saying, that "Wardsfork" (skillful as I know him to be) is here out of the secret. It has been held by them as essential to a crop of good quality, that it should be suffered to get thoroughly ripe before it is cut. The only evidence Wardsfork gives, is that the heaviest and highest price tobacco he ever made, was cut before it became very ripe. This opinion is new to me, and to many others—and I appeal to the planters of Wardsfork, whether this is not a heresy, and whether Wardsfork ought not to sustain his doctrine with more conclusive testimony, (than the weight and price of his tobacco) before he incurs the responsibility of leading many, who have great confidence in his skill and opinions, to follow his example. I will venture to assert, that of the ten or twelve distinguished planters on Wardsfork, he is the only one that entertains that opinion. And it seems to me, that it is contrary to the very nature of things. There is a point of maturity in every species of vegetation, beyond which it must decline: but that

point is certainly thorough maturity—any thing short of this must be imperfect. The best planters I know, are those who let their tobacco get thoroughly ripe—and the best tobacco I ever saw, was that which was cut the ripest. My own experience has been, that tobacco cut before the whole leaf is ripe, will be found tender and devoid of elasticity; as well as uniformity of texture and color throughout the leaf—while perfectly ripe tobacco is almost certain to present these qualities. If the tobacco is suffered to stand in the field until it has passed the point of perfect maturity, then I concede there is a loss both in the weight and the beauty of the crop. The question turns then upon this point—when is tobacco matured? I hold that when the leaf will break readily on doubling between the finger and thumb, and presents a beautifully varied complexion of green with yellow spots, and a surface smooth and rich throughout, even to the fringe or ruffle around the stalk, where the stem grows to it: that then it is mature—and such will be its appearance in all ordinary seasons. In very wet seasons, the yellow spots do not always appear, owing to the great quantity of sap—which was probably the case with those crops of Wardsfork, which turned out so well—but in this case the brittleness is increased.

I hope Wardsfork will duly appreciate my motives in declaring my dissent to the doctrine he has advanced. With the highest respect for his character in all the relations of life, and especially as an enlightened agriculturist, and with the most unfeigned good will personally towards him, I can have in view no object but to elicit truth, and to promote the cause in which we are both engaged. For however we may differ in relation to the point in dispute, I do not pretend to set my skill up in competition with his, but merely caution those who are accustomed to make good tobacco, not to listen too much to suggestions, not sustained by long experience, or convincing testimony.

M.

From the Southern Banner.

SUBTERRANEAN VILLAGE.

Naucoochee Valley, June 8, 1834.

Gentlemen—A singular discovery has recently been made in this vicinity, of a *subterranean village*, which though not so extensive as *Herculaneum* or *Pompeii*, involves much mystery and speculation, and offers a new subject of inquiry to the geologist and antiquary. The houses were discovered by excavating a canal for the purpose of washing gold. The depth varies from seven to nine feet—some of the houses are embedded in the stratum of gravel, which is auriferous, and yields fine profit to the operators.—The logs are but partially decayed, and from ten to twelve feet long. The walls are from three to six feet in height, joined together, forming a straight line upwards of 300 feet in length, comprising 34 buildings or rooms. The logs are hewn at the ends, and notched down as in ordinary cabins of the present day. In one of the rooms were found three baskets made of cane splits resting upon the slate, also a number of fragments of Indian wear, similar to that manufactured by the Cherokees at the present period.

From the circumstance of the land having been covered with a heavy growth of timber previous

to its cultivation by the whites (twelve years since,) we must necessarily infer, that they were built at a remote period, and by some powerful cause have been submerged and covered by continual additions of alluvion. The stream is about 30 feet wide, and is said by Mr. Sanford, (who is now operating on it for gold very successfully, and from whom I derived most of my information with regard to the houses,) to be one of the most productive gold deposits in the country. The houses are situated from fifty to one hundred yards from the principal channel of the creek and as no farther excavations have been made, it is more than probable, that new and more interesting developments will be made when the land is worked for gold.

A great number of curious specimens of workmanship have been found in situations, which preclude the possibility of their having been moved for more than a thousand years. During my mining operations last year, I found at one time, about one half of a crucible, of the capacity of near a gallon. It was ten feet below the surface, and immediately beneath a large oak tree which measured five feet in diameter, and must have been four or five hundred years old. The deposit was diluvial, or what may be termed table land.

The stratum of quartz gravel in which the vessel was imbedded, is about two feet in thickness, resting upon decomposed chlorite slate.

It is not difficult to account for the deposit of those substances in alluvial soil, for the hills are generally very high and precipitous, and from the immense quantity of rain which falls, the streams are swollen to a great height, sweeping every thing with them, and frequently forming a deposit of several feet in thickness in a season; but some of the diluvial land is from ten to fifty feet above the present level of the streams. These deposits exhibit appearance of as great attrition as those recently formed.

There was a vessel, or rather a double mortar, found in Duke's Creek, about five inches in diameter, and the excavation on each side was nearly an inch in depth, basin like, and perfectly polished. It was made of quartz which had been semi-transparent, but had become stained with the iron which abounds in quantity in all this country. In the bottom of each basin was a small depression half an inch in depth and about the same in diameter. What its use could have been, is difficult to conjecture. Some suppose it was used for grinding paint, &c., or in some of their plays or games. The high finish, and its exact dimensions, induce me to believe it is the production of a more civilized people, than the present race of Indians.

Respectfully yours,

M. S.

From the Southern Planter.

BRIMSTONE FOR CATTLE.

Dr. Bartlett: It is probably not known to many of our farmers that brimstone is valuable for cattle in keeping them free from ticks. These vermin are not only filthy in their appearance, but an injury to the cattle. A piece of brimstone as large as a grain of corn, well pulverized, given in a little salt, will cause them to drop off, and prevent others from getting on for eight or ten days. I consider brimstone as necessary for a cow in the summer, as salt.

ON THE PETITION FOR A CHANGE OF THE LAW OF ENCLOSURES.

If the question of the good or bad policy of our present law of enclosures was considered fairly, either as a matter of right and justice—of public interest—or of private interest to nineteen-twentieths of all the individual cultivators of the soil of Eastern Virginia—there would be no doubt of the condemnation of the law, on either, or all of these scores, by any intelligent tribunal, having in consideration the circumstances and well-being of all. But, unfortunately, almost every question affecting public and general interests, is discussed upon false or improper grounds; and it is easy to foresee what will be the grounds assumed to oppose this beneficial change. It will be said by those who, for their own aggrandizement or profit, are ever attempting to delude the poor and ignorant by professing to be their exclusive friends and defenders, that this change is for the benefit of the rich, and cannot be made but by sacrificing the rights and interests of the poor. But the slightest consideration will show that the benefit to be derived by land occupiers (other circumstances being alike) will be the greater in proportion to the small extent of their possessions—as every one knows that the smaller the fields are, the greater extent of fencing is required to enclose them, in proportion to their size. Hundreds, perhaps thousands of small tracts of land in Lower Virginia, are left untillied, waste, and unproductive, because the whole rent or net product, would not pay for the expense of fencing—whether with our perishable “old field pine” timber, or with more durable and more costly materials. Of course, such land yielding nothing to the owners, is worth nothing for them to hold: but may be sold for a low price to some adjoining large landholder, who can afford to bring the land into part of a much larger enclosure. If he had not this advantage, he could not afford to give any thing for the land, for the same reason that the first owner could obtain nothing by its cultivation: but his owning a large body of land enables him to buy of his poor neighbor at \$2 per acre, what will be to the purchaser worth perhaps \$4 or more, and which to the seller was worth nothing. Such effects of our fence law are numerous and notorious. Indeed, if wealthy men and large landholders wished to buy up the small tracts of their neighbors’ at the lowest price—and if they were so short-sighted as to expect to prosper by the general loss and distress of the community—they ought to sustain the present law of enclosures, as the sure means for reaching their object.

But perhaps it is still a poorer class for whose interests the “friends of the poor” will uphold the present law—those who own *no land*, and who by the present law enjoy the privilege of keeping stock on the unenclosed lands of others. Those who will venture to use this argument ought not to be ashamed to demand that no laws should protect our corn and meat houses, lest the poor should suffer for want of food. But should it be required to oppose this miserable petty larceny ground of argument, (it deserves no better name,) it would be better to buy up this existing privilege, at double its full value. The privilege of grazing the un-

enclosed lands of other persons in Eastern Virginia, is worth scarcely any thing to the few who use it, and costs at least an hundred times as much to those who suffer the grievance. All the stock raised by grazing at large, and the profits of every kind, just and unjust, derived from the existence of the law of enclosures, would not pay one-tenth part of its cost to the community. The change asked for, which is simply that each man shall secure his own stock, would serve to add one-fourth to the average net profits of cultivation throughout Lower Virginia. If the greater comparative extent of forest, and other land unfit for tillage, west of the Blue Ridge, makes a change there inexpedient, there is no reason why the existing law should not remain in operation there, as long as those circumstances may continue. It is unnecessary here to repeat the arguments for the change of this law, which have already been presented in several articles, to our readers. We have aimed to confine our remarks to those points, which, as being of minor importance, have been passed over, or but slightly touched by others.

The foregoing remarks were written for the 5th No. and were at first intended to accompany the petition for a change of the law of enclosures: but were kept back as not required, and because it was useless to anticipate objections which had not then been made. No considerable objections were to be expected, so long as the discussion was confined to men of intelligence, and to all those who *read*, and are thereby entitled to judge for themselves. The objections that *might* proceed from such persons (for none have yet appeared in print,) would be founded on reason and justice, and would be such as they who uttered them would have no cause to be ashamed of. There will always be some strong objections to a thorough change of any long established and widely operating policy—and the advocates for this, cannot claim the existence of the fence law to be a case of unmixed evil. Objections of this kind, whenever they may be presented, should be met with respect, and opposed as proceeding from friends who have in view the same general object, the preservation and promotion of the interests of agriculture. But since our publication of the petition to the legislature on this subject, the cause has been transferred to a very different tribunal—to court yards and places for warrant trials, where fifth rate demagogues, who read nothing that serves to increase their glimmering lights, can influence the opinions of those who do not read any thing. Judging from the verbal reports that have reached our secluded dwelling place, the pitiful ground of argument, which was anticipated above, is mainly relied on by these self-constituted and noisy guardians of the interests of the people. They take precisely the position that we expected before they had ever heard of the question. The ground of objection and the manner of its being urged, are similar to all other attempts to array the poor against the rich, which have at all times proceeded from those men, who were striving to build up their own dirty interests, by deluding and defrauding both poor and rich. There are few men, capable of exerting the smallest political influence, who are so foolish as to believe that even the poor can be benefited by mea-

asures which impair the rights of property. Those who urge such measures with any success, *know* that all classes, and the poor not less than the rich, are interested in preserving the rights of property: but the office seeking demagogue also knows that his own interest may be served by his country's loss, and his own interest is all he seeks. Whatever may be his rank in the despicable roll—whether his ambition aims at the highest or the lowest office in the people's gift, the general course of the demagogue is the same. When he talks about "honor and patriotism, pure disinterestedness, and devotion to the popular will," there is most reason for the people to expect an attack upon their political rights, and property.

Labor is the only source of all property. There is nothing that helps to constitute wealth which has not been created by, or received the whole of its value from labor alone. God has given to man in abundance the materials for wealth—but these materials require to be worked up, and brought into a useful and productive state by labor, and without it they are utterly worthless. The property of the richest farmer in Virginia, to the last cent, was acquired by his labor of body or mind—or by the labor of his forefathers, or of whomsoever he received his property by the course prescribed by law. Every man, from nature, derives the power to labor, and by its exercise, the ability to accumulate property—and in this happy country, there are few citizens having nothing but their labor, who might not pass from this class, to that which holds property accumulated by the previous exercise of labor. The preservation of the rights of property is as indispensable to aid the first conversion of labor to wealth, as to secure the possession afterwards—and every man is personally and deeply interested in preserving the sanctity which has generally been attached in Virginia to the rights of property. Without these rights, all would be as poor as the most destitute now are—and every violation permitted to exist, serves not only to lessen the security and value of accumulated property, but also to obstruct its accumulation.

From the Library of Useful Knowledge—Farmer's Series.

PHYSICKING HORSES.

This would seem to be the most convenient place to speak of physicking horses, a mode of treatment necessary under various diseases, but which has injured the constitution of more horses, and in fact absolutely destroyed more of them, than any other thing that can be mentioned. When a horse comes from grass to hard meat, or from the cool open air to a heated stable, a dose of physic or even two doses may be useful to prevent the tendency to inflammation which must be the necessary consequence of so sudden and great a change. To a horse that is becoming too fat, or has surfeit, or grease, or mange, or that is out of condition from inactivity of the digestive organs, a dose of physic is often most serviceable; but we do enter our protest against the periodical physicking of all horses in the spring and the autumn, and more particularly against that severe system which is thought to be necessary to train them for work,

and the absurd method of treating the horse when under the operation of physic.

A horse should be carefully prepared for the action of physic. Two or three bran-mashes given on that or the preceding day are far from sufficient, when a horse is about to be physicked, whether to promote his condition or in obedience to custom. Mashes should be given until the dung becomes softened; a less quantity of physic will then suffice, and it will more quickly pass through the intestines, and be more equally diffused over them. Five drachms of aloes, given when the dung has thus been softened, will act much more effectually, and much more safely than seven drachms, when the lower intestines are obstructed by hardened faeces.

On the day on which the physic is given, the horse should have walking exercise, or may be gently trotted for a quarter of an hour twice in the day; but after the physic begins to work, he should not be moved from his stall. Exercise then would produce gripes, irritation, and possibly dangerous inflammation. The common and absurd practice is to give the horse most exercise after the physic has begun to operate.

A little hay may be put into the rack; as much mash may be given as the horse will eat, and as much water, with the coldness of it taken off, as he will drink. If, however, he obstinately refuses to drink warm water, it is better that he should have it cold, than to continue without taking any fluid; but he should not be suffered to take more than a quart at a time, with an interval of at least an hour between each portion.

When the purging has ceased, or the *physic is set*, a mash should be given once or twice every day until the next dose is taken, between which and the *setting* of the first there should be an interval of a week. The horse should recover from the languor and debility occasioned by the first dose, before he is harassed by a second.

Eight or ten tolerably copious motions will be perfectly sufficient to answer every good purpose, although the groom or the carter may not be satisfied unless double the quantity are procured. The consequence of too strong purgation will be, that a lowness and weakness will hang about the horse for many days or weeks, and inflammation will often ensue from the over-irritation of the intestinal canal.

Long continued custom has made aloes the almost invariable purgative of the horse, and very properly so; for there is no other at once so sure and safe. The Barbadoes aloes, although sometimes very dear, should alone be used. The dose, with a horse properly prepared, will vary from five to seven drachms. The preposterous doses of nine, ten, or even twelve drachms are, happily for the horse, generally abandoned. Custom has assigned the form of a ball to physic, but good sense will in due time introduce the solution of aloes, as acting more speedily, effectually, and safely.

The only other purgative on which dependence can be placed is the croton. The farina or meal of the nut is used; but from its acrimony it should be given in the form of ball, with linseed meal. The dose varies from a scruple to half a drachm. It acts more speedily than the aloes, without the nausea which they produce; but it causes more watery stools, and consequently more debility.

Linseed oil is an uncertain but safe purgative,

in doses from a pound to a pound and a half. Olive oil is more uncertain but safe; and castor oil, that mild aperient in the human being, is both uncertain and unsafe. Epsom salts are inefficacious, except in immense doses of a pound and a half, and then not always safe.

From the Fincastle Patriot.

WHITEWASHING.

It is a very common practice to whitewash rooms, walls, and fences, with simple lime and water. The result is, that a touch brings it off upon the hands or clothes, and a few successive rains leave almost entirely bare the materials upon which it has been laid, and which are exposed to the weather. On in-door work a little glue will fix it so that it will not easily rub off, nor whiten the dress that happens to come in contact with it. Out of doors, glue alone will not answer. Skimmed milk is probably the cheapest and best ingredient that can be easily procured. Those who put whitewash without any thing of this kind to retain it, act on the same principle as if they should fill a sieve with water, or cover a house with shingles without nailing them on.

WINES AND VINEYARDS.

[For the following extracts from the *Journal of a recent visit to the principal Vineyards of Spain and France*, we are indebted to the review of that work by the London Monthly Magazine. The general reader may be amused by some of the details, and the consumers of what are called *old and pure wines* will be more interested than pleased, to learn some of the secrets of trade, concerning the age and purity so highly prized.

There are certain kinds of wine, of which the *Hermitage* is one, of great celebrity, each of which is the product of only one (and that a very limited) body of land. The high prices of these wines have been a sufficient inducement to produce elsewhere others of like qualities: and their character has been established long enough to give full time for attempts at imitation. It is certain that the peculiar qualities of these wines cannot be caused by climate, because the like cannot be made at the distance of a mile—nor by the *apparent* texture of the soil, nor inclination of its surface, as both these could be found in many other situations. The passage below concerning the calcareous soil (and that not too highly calcareous) of the Hermitage vineyard, seems to indicate the cause of the value of the product to be in the quality of the soil; and that the peculiar quality of soil required, though not evident to the senses, may be easily discovered by chemical analysis. It is not expected that calcareous manures will give the flavor of Hermitage wine to that of all vines: but it would be worth trying whether such manures would not improve the flavor and increase the product of all vineyards in this country. There is so little of natural calcareous soil in the old settled parts of the United States, that it is most probable that not one vine has been planted on such soil. It would be very easy to try the application on a few vines; and if it was found beneficial, vineyards, from

their small extent and great value, might be limed or marled at an inconsiderable expense, no matter where situated. If there should be found no other benefit, an important one might be found in this—that calcareous soil suffers much less than any other by the extremes of both wet and dry weather—and the first of these extremes, is particularly hurtful to the products of vineyards.]

"A violent storm of wind and rain made it impossible to quit the house yesterday, and though the rain continued to fall at intervals to day, I managed to visit, in company with Dr. Wilson, the cellars of the house of James Gordon and Company. The extent of these cellars is quite immense—the extreme length of the largest being 110 Spanish *varas*, about 306 English feet, and the breadth 222 feet; the roof is supported by rows of massive square columns of mason work, and although the whole cellar is not of the above length or breadth, the principal division of the building being only 200 by 150 feet, yet with its various adjuncts, the whole extent of the cellar is equal to the dimensions first stated. Messrs. Gordon and Company have also another very extensive cellar, though not equal to this in dimensions. Their ordinary stock of wine is said to be 4000 butts: this is kept in casks of various sizes, containing from one to four butts. These casks are ranged in regular rows; in some parts of the cellar to the height of four tiers. They are called *seletras*, and are always retained in the cellars. They contain wines of various qualities and ages—from one to fifty years. The wine merchants of *Xeres* never exhaust their stock of finest and oldest wine. According to the place at which the wine expedited to the market is intended to be sold, it contains a larger or smaller proportion of old wine. But is only in wines of very high price, that even a small portion of their finest wines is mixed. What is withdrawn from the oldest and finest casks, is made up from the casks which approach then nearest in age and quality, and these are again replenished from the next in age and quality to them. Thus a cask of wine, said to be fifty years old may contain a portion of the vintages of thirty or forty seasons."

"The highest qualities of sherry are made up of wine the bulk of which is from three to five years old, and this is also mixed in various proportions with older wines. Thus, from the gradual mixture of wines of various ages, no wine can be farther from what may be called a *natural wine* than sherry. But, besides giving the wines, as they are prepared for the market, mellowness and richness, by the additions of older wines, there is a very dry kind of sherry called *Amontillado* or *Montillado*, which abounds in the peculiar nutty flavor that distinguishes sherries, and which is frequently added when that is deficient. Being very light in color, it is also used to reduce the color of sherries which are too high; and when, on the other hand, color is required, the deficiency is made good by the mixture of *boiled wines*, or rather of *boiled must*."

"The lowest priced sherries are in general the growth of Port St. Mary's or San Lucar, two districts within ten miles of *Xeres*; or they are brought round from Malaga to Port St. Mary's, and thence

transhipped for England under the name of sherry, perhaps after having been landed and mixed with other wines to give them the qualities in which they are deficient. All these low-priced wines are largely mixed with brandy, being intended for the consumption of a class of people who are unable to judge of any quality in wine but its strength. But brandy is added in very small proportions to the good wines—never in greater quantities than four or five per cent. while they remain in the cellar, and frequently not at all, unless the wine should become *scuddy* or *mothery*; and thus the finest wines are frequently entirely free from it; but on their shipment, a small dose of brandy is considered absolutely necessary even to fine wines, to make them bear the voyage, as it is said; but in reality, because strength is one of the first qualities looked for by the consumers."

"On entering his cellar, or rather pressing-room, we found the laborers at their dinner. Bread seemed here, as elsewhere, the chief article of their diet. There was also abundance of prickly pears and grapes. We passed to the cellar where the new-made wine was stored, and tasted in its various states. The wine of a fortnight old was still very sweet, although the fermentation was now barely sensible. We also tasted the sweet wine of the same age, made from the *Pedro Ximenes* grape, and we conceived it to be barely possible for any thing to be more luscious, although we were informed that in a dry season it is much richer. He said he had about 200 butts of the sweet wine, and wished it were all of that quality, it was so useful in mixing with his purchased wine for exportation."

"On returning from the cellar to the pressing-room we found the presses at work. There were eight troughs, similar in shape and dimensions to those formerly described, each with its wooden screw in the centre. A large quantity of grapes being heaped up in one part of the trough, they commence by strewing upon them as much powdered gypsum, or sulphate of lime, as a man can take up with both hands. A portion of the grapes are then spread over the bottom of the remainder of the trough, upon which the men jump with great violence, having wooden shoes, with nails to prevent their slipping. After the greater part of the grapes are pretty well broken, they are piled up round the screw, and a flat band, made of a kind of grass, is wound round the pile, commencing at the bottom, the broken grapes being heaped and pressed in as the band is wrapped higher and higher, till they are all compressed into it. They then commence working the screw, and the must flows with great rapidity."

"Some of them, he says, are twenty years old and upwards. Some of his wines of seven or eight years old resembled a good sherry, and he agreed with me in thinking that his sweet wine of that age was equal to those three times as old. He further agreed with me, that the great age of those wines did by no means add proportionably to their quality; and he evidently understands the art of giving the qualities generally attributed to age, by mixing, and other management. He himself hinted at the success with which he had con-

ducted this branch of trade, and he has the reputation of having acquired great wealth."

[At Perpignan] after taking chocolate we proceeded to vineyards. Mr. Durand only cultivates three varieties of vines, the Grenache, which gives sweetness, the Carignan, which gives color, and the Mataro, which gives quantity. His vines are in general planted either on the plain or on a gently inclined slope; but when there is a slope the exposure is always to the south. The soil is loose and stony, the stones quartz, of various colors and shades." [This wine is known by the name of Rousillon.]

The finest Clarets of Bordeaux are mixed with a portion of the finest red wine of Hermitage, and four-fifths of the quantity of the latter which is produced are thus employed. The wines are racked off the lees in spring, and sulphured. A very small piece of sulphured match is burnt in the casks intended for the white wine; the red wine requires a greater portion. These matches are purchased from persons who make a business in preparing them. They are slips of paper, about one inch and a half broad, and when coated on both sides with sulphur, are about the thickness of a sixpence. A piece of one inch and a half square is sufficient for a cask of white wine containing 50 gallons."

"The hill of Hermitage is so called from an ancient hermitage, the ruins of which are still in existence near its top. It was inhabited by hermits till within the last 100 years. The hill, though of considerable height, is not of great extent; the whole front which looks to the south may contain 300 acres, but of this, though the whole is under vines, the lower part is too rich to yield those of the best quality, and a part near the top is too cold to bring its product to maturity. Even of the middle region the whole extent does not produce the finest wines. M. Machon, the gentleman whose property we were traversing, pointed out to me the direction in which a belt of calcareous soil crossed the ordinary granitic soil of the mountain, and he said it requires the grapes of these different soils to be mixed, in order to produce the finest quality of Hermitage. I took home a portion of the soil which he pointed out as calcareous, and the degree of effervescence which took place on my pouring vinegar upon it, indicated the presence of a considerable portion of lime. It is probably to this peculiarity that the wine of Hermitage owes its superiority, for to all appearance many of the neighboring hills on both sides of the Rhone present situations equally favorable, although the wine produced even upon the best of them never rises to above half the value of the former, and in general not to the fourth of their value. A good deal may also be attributable to the selection of plants. The best red wines of Hermitage are made exclusively from one variety, and the white wines from two varieties; but in the district generally a much greater number of varieties are cultivated. The Red Grape is named the *Ciras*. The white varieties are the *Roussette Marsan*. The former yields by itself a dry and spirituous wine, which easily affects the head—the plant produces indifferently—the latter yields a

sweeter wine—they are mixed together, to produce the best white Hermitage.”

“After quitting the vineyards of Champertin, I rejoined the *cabriolet*, and after recovering the main road, proceeded to Clos Vougeot. This vineyard formerly belonged to a convent, and the buildings are therefore rather extensive. What was the old vineyard is enclosed by a high stone wall, but M. Ouvrard, the present proprietor, has also acquired a considerable portion of the land without the wall, and the present extent of the Clos Vougeot is therefore 48 hectares, 112½ English acres.

“They commence selling [the Clos Vougeot] it when three and four years old; but the wine of very favorable seasons is retained by the proprietor till it is ten or a dozen years old, when it is bottled, and sold at the rate of six francs a bottle. The price of the wine of ordinary vintages, from three to four old, is from 500 to 600 francs the hogshead, but seasons occasionally occur when the wine is not better than the *Vin Ordinaire* of the country. The wine of 1824 was given to the laborers as their ordinary drink, that of 1825 is now ripening in the large vats, and will be worth, in three or four years more, six francs a bottle. The wine has been found by experience to be of better quality, and to preserve its perfume better, in these large vats than in casks.”

“The very eminent wine house of Messrs. Ruinart and Son, of Rheims, are agents for Herries, Farquhar, and Co.’s notes. Having called upon them to cash one of these, M. Ruinart, junior, conducted me over their wine cellars, which are very extensive and all subterranean, consisting of three under-ground stores, one beneath another, all mined out of the limestone rock. The wine [Champagne] which has received the last attentions which it requires, and is ready for expediting to the consumer, is packed in large square masses, bottle above bottle, and side by side, with no other precaution to keep them steady than a lath passing along between the necks of one layer and the butts of the next layer above. They generally send the wine to the consumer at the age of three and four years, but after the first winter it is all put in bottle. The stock therefore, appears immense, and indeed it is very large, for not only are different qualities required, but also different descriptions to suit the varying tastes of their customers in England, America, and Russia, to which countries Messrs. Ruinart make their chief exports. A gentleman with whom I travelled, told me that he could buy very good sound Champagne at Chalons for two francs a bottle, and was then going to purchase 100 bottles at that price, but respectable wine merchants never send any to England under three francs a bottle. What is sent to England is more spirituous, and froths more strongly than what is sold for domestic consumption. The greatest and most minute attentions are necessary in preparing Champagne. The casks in which it ferments, after running from the press, are previously sulphured to prevent the fermentation from proceeding to too great a length. It is twice clarified during the winter, and in the month of March, before the return of spring has renewed the fermentation, it is bottled off. When

in this state the bottles are placed in frames, diagonally, with their heads downwards. The lees are thus collected in the neck of the bottle, but they do not consider it necessary to uncork the bottles as soon as the wine is perfectly clear, nor is it considered that there is any danger of the wine spoiling if the return of warm weather should cause a re-commencement of the fermentation, and re-mix the lees through the wine. On the contrary, they sometimes allow the lees to remain to ripen, as they term it longer than usual. The wine in general, remains in this state till the following winter, each bottle is then placed in a frame, and carefully uncorked. The contents of the neck of the bottle are emptied. It is filled up from another bottle of the same wine, and being re-corked, only now requires age to give it all the perfection it is capable of. It of course often happens, that the wine has either undergone less than the usual fermentation, or being stronger than usual requires a greater fermentation before being put into bottles; and it consequently happens that the fermentation in the bottles is greater than they can bear, and that a large proportion of them burst during the first summer. The floors of the wine cellars are all covered with grooves, sloping to a gutter, by which the wine which has burst the bottles is conveyed to a cistern in the floor, and, as there is the most perfect cleanliness observed, a part of the wine is thus sometimes saved.”

From the Journal of Commerce.

GOLD MINES IN VIRGINIA.

Spottsylvania County, Va. Oct. 4th, 1834.

Having spent some time in the rich copper region of the Blue Ridge, I returned on the 4th, to the Gold mines of the United States Company in Spottsylvania county. Here I found the miners engaged in raising ore from the shaft. As soon as the ore came into daylight, gold was distinctly seen on many of the rocks; and on beating them promiscuously into sand, and washing away the lighter particles, the results of pure metallic gold was still more beautiful and surprising. I descended into the shaft about 30 feet, and after passing along in a tunnel 100 feet, I came to the vein, which, by admeasurement, was found to be 21 inches in diameter, and dipping at an angle of about 60°. I send you a common specimen of the vein, which was broken down in my presence, and which, if skillfully examined, will be found to contain from \$40 to \$50 per hundred weight or bushel. The whole expense of raising and working this ore is from 60 to 65 cents per hundred weight or bushel.—This company is now fully organized, and in full operation, under a charter granted by the legislature of Virginia, Jan. 9, 1834. Their mining operations appear to be conducted with economy and skill, by Capt. Rau, an experienced German miner. The excellent water power, abundance of wood and timber upon their own lands, together with the richness of their ore, render the prospects of this company uncommonly promising.

Separated only by the Rappahannock River are the Rappahannock Gold Mines, under the direction of Professor John Millington. These mines are the property of a company in Philadelphia, and although not so extensive as those of the United States Company, still their ores are found to

be rich in gold, and well worth working; as may be seen from the following extract of Mr. Millington's Report. "It may therefore be fairly inferred that if the experiment had been better and more accurately conducted, and made on a larger scale, each pound weight of average ore would have yielded one grain of gold, or at the rate of five pennyweights to the hundred pounds weight of ore, which is much more than the probable, or indeed possible cost of working the mines,—as we conceive that could in no case amount to so much as one dollar upon the hundred pounds weight."

I remain yours very respectfully.

F. SHEPHERD.

From the Journal of Commerce.

GEOLOGICAL DESCRIPTION OF THE GOLD REGION OF VIRGINIA.

Stafford County, Va. Oct. 7th, 1834.

In passing from tide water to the Blue Ridge, the whole country is undulating, consisting of hills of moderate elevation, intersected with vallies or rather ravines of moderate depth. The soil for the most part is composed of bright red clay, highly colored with the oxide of iron, and formed from the decomposition of vertical laminæ of Talcose slate or schist. As you approach the metallic veins, this red clay becomes intermixed with fragments of quartz, comminted by the action of the atmosphere, and mechanically spread upon the surface for some distance, by the action of the rains and ploughing, and the like, from year to year. At the distance of sometimes a few inches, and sometimes a few feet below the surface of this bright red soil, is found the talc or talcose slate, generally of a greenish grey color, soapy to the touch, and of a greasy lustre. This rock is the *Talkschiefer* of Germany, and is commonly known throughout the world, in gold mining districts, as gold slate, or as the slate peculiar to gold regions. It is composed of magnesia, from 30 to 40 per cent., silic from 50 to 60 per cent., and oxide of iron, allumine and sulphur, in small and variable proportions.

The leaves or laminæ of this slate are vertical, and often intermixed with iron pyrites, containing gold in a foliated form, very much like thick gold leaf. These iron pyrites are generally richer in gold, when found in the slate alongside of a quartz vein. The quartz veins are vertical walls of white flint, containing oxide of iron, and frequently iron pyrites and specular oxide of iron beautifully crystallized.

The diameter of the quartz veins, varies from the fourth part of an inch to six or eight feet. All these veins are found between and parallel to the layers of slate, and extend longitudinally in a direction $41\frac{1}{2}$ degrees North East. Sometimes the gold is found in quartz veins, in large masses, and sometimes distributed through the same in fine grains, and hidden, as it were, by the oxide of iron. Frequently specimens of this kind are rich when no gold is externally visible. Sometimes the large or main vein is found to be rich, and then again, the gold is absent from it altogether. In such cases, the gold is generally found in parallel thread veins frequently at some distance from the large or principal vein. Sometimes these

veins dip like coal strata, and pass under rivers and rise again; and again they are cut asunder by streams, and the rocks of the vein broken or ground to sand, by attrition, the gold washed down the stream in grains, and overspread with gravel. As these grains of gold are indestructible, they are not unfrequently carried by currents and floods down into secondary regions, where they assist in forming new sandstone, conglomerate, and the like. These deposits of gold are often very rich, and much of the gold of Virginia is obtained, by carefully washing the sand found at the bottom of the gravel in the streams and low grounds.

Other metals are usually associated with the gold in the veins and in the slate. I have never failed to find a greater or less portion of silver. I have also in some instances, found copper and blennde, antimony and galena. In many instances the sulphuret of iron or hepatic pyrites may be said to be the dwelling place of the gold.

This whole gold region is based upon granite, and evidently belongs to that formation, which Professor Blumenbach denominates the second class of primitive rocks. As yet I have not discovered that they contain any organic remains. Very respectfully, yours,

F. SHEPHERD.

ON THE CHEAT CONTROVERSY.

To the Editor of the Farmers' Register.

My present purpose is, perhaps a very thankless one; for should it prove successful, I shall deprive our brother agriculturists of a most prolific source of contention and wordy warfare; which, strange to say, is often of as angry a character, as any that the bitterest politicians ever wage against each other: I mean the apparently endless dispute about the convertibility of wheat into cheat. But the spirit moveth me to the undertaking, and I will proceed; being willing to submit it entirely to the better judgement of yourself and your subscribers to decide, whether he who attempts to appease and to terminate strife, is not, in fact, a very ill-natured man; inasmuch as he does, (should his design be accomplished) deprive others of all pretext for doing that which must be a great gratification to them, or they would not continue to do it. In performing this seemingly hopeless task, it is not my intention to furnish a solitary fact applicable to the controversy, because we have already before us thousands of what are called and considered *facts* of entirely opposite, and even contradictory character—adduced too, by as veracious men as any in our community; so that our hopes from *these*, so far as yet supplied, may truly be said to be utterly fallacious. This may possibly appear a very extraordinary declaration on the part of one professing such a design as I do; but a little reflection will satisfy any considerate man, that this curious dispute may last to the end of the world, unless some other mode can be devised for ending it, than any which has yet been promulgated—that only excepted, which you and your friends tried and published some time ago, and which, as far as I recollect, is the only one well calculated to attain its object. Had you added only a few more particular notices, you would have made your experiment so complete, as not to leave the shadow of doubt on the minds of any, but that class of incurably credulous mortals, who can believe that

jugglers actually manufacture with, and draw out of their mouths, countless yards of riband, and fry good pancakes in their hats. All the other publications that I have seen, have been the mere conclusions of the writers, from results favorable to their own preconceived notions: which they themselves choose to ascribe to causes that *might* have had no more to do with them, than the shape of last year's clouds. All that could certainly be pronounced true of these communications, was that cheat came up where the writers did not expect it; and that *they supposed*, from circumstances appearing to *them*, but to nobody else, conclusive, it proceeded from wheat plants converted into cheat by some incomprehensible process, utterly at variance with all the known laws of the vegetable kingdom. I again repeat, and challenge denial, that no experiment heretofore published, except that of yourself and friends, can be called any thing but an *ex parte* one; and such as was totally deficient in that particularity, minuteness, and accuracy of observation which are indispensably necessary to settle any such long controverted point. The champions of each opinion have utterly eschewed the admirable "non-committal policy"—they have too long been decidedly arrayed against each other on opposite sides, to yield to any thing less than a series of facts which can be neither gotten over, under, nor around. These I fully believe would be furnished by the experiment which I am about to suggest, if any persons could be prevailed upon to make it: it is hoped that several may, as neither the expense nor labor would be worth regarding in a matter about which so many persons have deeply interested themselves.

The experiment I would suggest, is that two or three gentlemen of well known respectability, should each select three or four dozen grains of the best wheat they can find. Let these be planted in well prepared land of good quality—say in two rows one foot apart, and the grains at regular intervals of four or five inches, so as to admit of hand weeding. Mark each spot carefully with a small stick, and as soon as the blades appear above the ground, scratch away the earth on one side until each grain is discovered, which will certainly show whether the supposed wheat blades really spring from the deposited wheat grains, or from something else. This being determined, let the earth be carefully replaced, and the now ascertained wheat blades be daily examined, that the wonderful transmutation may not steal a march upon the examiners, but may be detected, (if it takes place at all) at the very moment of its commencement. But as the grazing down of the blades is generally deemed necessary to insure the metamorphosis, and the bill of a goose, (I mean nothing invidious, my good sir,) has been thought particularly efficacious in accomplishing the marvellous change, let as many geese as necessary, be constantly grazed upon one half of the rows until late in the spring, and taken off only in time to enable the plants to throw out each its own head, or heads. Now as the blades of wheat and cheat are known to differ from each other, nearly or quite as much as the grain does, if the process of watching the blades, not only during the whole goose-grazing process, but until the heads appear, be continued without a day's neglect, it would be impossible for any change in the nature and appearance of

any of the plants to take place without immediate detection.

If any gentlemen shall be induced to make the experiment just suggested, and in the manner above stated, and will then proclaim in your paper, under their own proper signatures, that the goose-grazed wheat actually turned into cheat, I for one, infidel as I have always been in regard to the convertibility of wheat into cheat, will publicly acknowledge the abandonment of my unbelief on this subject. I shall, however, not cease to wonder as long as I live, at such a marvellous departure from all the known laws of vegetable physiology. Indeed, I should not be more amazed were I to see realized a boast which I once heard in regard to the fertility of the Opelousas soil. Of this the boaster affirmed, that you might plant in it the over night, sow's tails, and by the middle of next day would find growing on the ends of them, fat pigs, large enough to make good roasters.

J. M. G.

[Our friend and highly esteemed correspondent, J. M. G., must pardon us for hinting that his remarks are liable to an objection very similar to that which he so justly charges to others. His tone of censure, it is true, is altogether different from that of the seemingly angry disputants whom he condemns; but his satire, however free from ill-nature or unkindness of feeling, may be as keenly felt as serious denunciation. Some persons would be more unwilling to be laughed at, than to be abused. But even if either of these courses were proper in discussing disputed points in agriculture, they would be misplaced in the "cheat controversy"—for though our own opinions are as decidedly opposed as J. M. G.'s, to the possibility of transmutation, yet we must admit that that side of the question is maintained by many persons, whose intelligence and experience claim and deserve, for their opinions, the most respectful attention.

The experiment proposed by J. M. G. as a means of deciding this dispute, seems far from likely to prove satisfactory. The strongest advocates of the transmutation doctrine, would expect a change rarely to proceed from good grains of wheat: and therefore if such experiments were repeated twenty times, without a plant of cheat being produced, it would still leave the change as much to be believed in as before. In the experiment reported in Vol. I, (p. 88) and which is referred to above with commendation, every known circumstance was brought into operation, which is charged to be a cause for the change of wheat to cheat. If that trial was not severe enough, let others be made more so—and those who contend for the change ought to have the liberty of choosing, and of making full use of every means for producing it. Permitting the most unlimited choice of means, and only requiring that every fact shall be strictly observed and proved, we hereby offer a *premium* of a complete set of the Farmers' Register from the commencement to the end of its publication, to whomsoever shall trace the progress of as many as three grains of wheat to as many perfect plants of cheat. Should the premium be claimed, we shall not judge of its validity, but will submit the matter for decision to others, the most competent to decide impartially and correctly as to the value of the

facts presented, and the evidence by which they are supported. The change from a single grain, if certain, would be as satisfactory as from any greater number—but three such changes are required the better to guard against possible mistakes, without adding any considerable difficulty to the operations of the experiment.]

CORN STARCH,

We are advised by an excellent house keeper, is no wise inferior to wheat starch, while it can be made with half the labor and expense. As this is the season for making it, we have obtained from our informant, for the Cultivator,

Directions for making it.—Take 30 good ears of green corn, fit for eating, grate the corn with a large grater, a lanthorn will do, into a pail of water; turn the whole through a fine metal cullender, or a coarse cloth strainer, to separate the hulls, &c. then change the water two or three times, to render the starch, which settles at the bottom, white and clean; and after the last water is removed, the starch may be cut in pieces, laid out a few days to dry, when it is fit for use, and may be kept any length of time. This quantity will suffice a year for a small family.—*Cultivator.*

From the Southern Agriculturist.

EFFECT OF MARSH-MUD ON VEGETATION.

A few days before the recent gale in August, we had about an inch thick of marsh-mud, (which had been thrown on the high ground, two months previous,) placed between five or six of the rows of an okra bed; shortly after the gale, we found the leaves dropping from every part of the okra, where no marsh mud had been placed, and nothing but the decaying stalks are now remaining. The okra had arrived at its maturity, and agreeable to the laws of nature, is decaying. But those parts where the marsh mud had been spread still remained in full and vigorous growth, and produced fruit as usual. Will some of the numerous readers of the *Agriculturist*, give an explanation of the causes of the above? Was there some property in the salt earth that produced it? Or may it have been produced by the roots having received an extra covering? May not the above fact be usefully applied to agriculture? The okra is very nearly allied to cotton, and was even placed under the same genus. May not the cotton plant be preserved from dropping its bolls at the particular season, by the timely application of marsh-mud?

From the Southern Agriculturist.

RAISING DUCKS AND TURKEYS.

In the *Agriculturist* of last year, appeared two articles, one on the best mode of raising ducks, and the other, on turkeys. Two seasons have since passed away, and the writer of this has been enabled to test the efficacy of those directions, and in every instance that has come under his knowledge, they have been attended with perfect success. The directions for raising ducks, were to feed them on animal food and keep them dry. Individuals who have adopted this plan, have sent to our markets from 500 to 700 ducks of the

finest kinds, and they have had no diseases among them, and found no difficulty in raising them.

Two or three individuals who tried the experiment of driving their turkeys, when young, to a distance from the house, where the greatest number of insects were to be found and feeding and housing them in the manner directed in the *Agriculturist*, have stated, that they have raised from 100 to 300 turkeys, and have pronounced it to be a method, which of all others, they believed best calculated to be attended with success.

[Some of the experiments cited in the following epitome have already been presented to the readers of the *Farmers' Register* in a more extended form.]

From the Cultivator.

BONES, HORNS, &c. AS MANURE.

Bones are in great demand, in Great Britain, as a manure; and great quantities are annually imported into that kingdom, from the continent, for this use. They are broken in mills constructed for the purpose, and often upon the farm, by the laborers. Bone dust ordinarily sells at about 2s. or 44 cents, and sometimes as high as 3s. 6d. per bushel; and at this price it is generally found to be a more profitable application than common dung. Bones are frequently applied, and by many preferred, when broken in half or three quarter inch pieces, and sometimes when of larger size. Their durability is in proportion to their size; the smaller they are crushed or ground, the sooner their fertilizing properties are exhausted—and the less the quantity required to be applied. They have been applied in various proportions; though the ordinary dressing is from 20 to 40 bushels per acre; a heavy dressing does not produce corresponding benefits, and in most cases, no additional benefit. Two bushels of crushed bones are deemed equal to a load or ton of manure. The uncrushed bones are sold at about 42s. or from nine to ten dollars the ton. Their quality is not considered to be impaired by their having been boiled. Bones are applied as a top-dressing to grass, and harrowed in with the grain in tillage crops. The following results are selected from a great many, to illustrate the benefit and economy of bone manure.

On the estate of Garrowby, in Yorkshure, the crops of turnips had dwindled to nothing; by the application of 12 to 20 bushels of bone dust per acre, in drills, the crops have become excellent, and the following crops are very considerably improved.

At Clumber Park, 600 bushels, spread upon 24 acres of pasture, a dry, sandy and gravelly soil, doubled the product, in butter, of the cows pastured upon it, over those fed upon pasture not boned.

Mr. Watson, of Riellor, applied 25 bushels of bones to an acre of turnips, and 25 loads of manure to an adjoining acre. The dunged acre yielded 22 tons; that dressed with bones 28 tons.

Mr. Graburn manured part of a field with crushed bones, at the rate of 30 bushels the acre, and another part with eight loads of dung, and repeated the dung the two following years upon this part. The turnips, wheat and grass, which constituted the three crops, were better upon the part once boned, than upon that thrice dunged.

Thirty-four acres of sandy soil, on the estate of

Sir Charles Thockmorton, were half manured with bones and half with dung. The first gave the earliest and best turnips; the barley which followed yielded five bushels the acre more than the dunged part, and the clover was also heavier upon the boned part.

Capt. Ogilvie applied bone dust at the rate of 15 to 20 bushels the acre, to a light sandy loam, and after the experience of five years upon a series of trials, he found all the successive crops of turnips, barley, and grass, decidedly superior to those which had been previously produced by other manure.

Twenty bushels of bone dust, at 2s. 6d. would be 50s.; 20 loads of manure at 10s., the price given in the statements, would amount to 200s., which shows a saving of three-fourths in manuring an acre with those substances, at the assumed prices, and in the assumed quantities.

The two following cases, taken from the Doncaster report, are worthy particular notice.

1. "On a field, part of which was boned 40 years ago, the crops were, on that part, during fifteen or sixteen succeeding years, visibly better than the remainder, although the land was all of the same quality, and the part not boned was manured with barn-yard dung.

2. "In another case, about three acres of light sandy land were dressed, in 1814, with 150 bushels of bones per acre; since which time the land is said never to have forgotten it, but is nearly as good again as the other part, farmed precisely in the same way, with the exception of the one application of bones."

As to the size in which bones are most profitably applied, one of the Doncaster Association remarks—"That if he meant to till for early profit, and if he wished to keep his land in good heart, he would use half inch bones; and, in breaking these, he should prefer some remaining considerably larger: that by using bones of a large size with dust in them, there must be sufficient of the small particles of the dust to set the turnip crop forward, and sufficient of the large particles of the bone left to maintain the land in good condition for the subsequent crop.

Bones are found on analysis to contain, in 100 parts, 40 of earthy and saline matter, 40 of cartilage and jelly, and 20 of fatty matter. The soft parts thus form, in the best bone about sixty, and upon an average about fifty per cent. which are almost entirely constituted of the same elements as plants, and all of them, sooner or later, liable to be dissolved and absorbed by the roots.

Bones should undergo a partial fermentation before they are applied, in order to produce the best immediate effect. This is done by mixing them with yard manure, or with manure and earth. They have also been mixed and applied with coal ashes with effect and economy.

The Doncaster Agricultural Association, after long experience in the use of bones, have published rules for its application, from which it appears,

That on dry sands, limestone, chalk, light loams, and peat, bones are a very highly valuable manure.

That they may be applied to grass with great good effect.

That on arable lands they may be laid on fallow

for turnips, or used for any of the subsequent crops.

That the best method of using them, when broadcast, is previously to mix them in a compost with earth, dung, or other manures, and let them lie to ferment.

That if used alone they may be either drilled in with the seed or used broadcast.

That bones which have undergone the process of fermentation are decidedly superior (in their immediate effects) to those which have not done so.

That the quantity should be about 20 bushels of dust, or 40 bushels of large, increasing the quantity if the land be impoverished.

That upon clays and heavy loams, it does not yet appear that bones will answer. [See No. 55 *Farmer's Series*.]

And where, it will be asked, are we to obtain bones to enrich our lands? Every farmer, we admit, cannot obtain them; but those who are located in the neighborhood of villages and cities may obtain a considerable supply. There are two bone mills already established on Long Island, and it is understood the proprietors find a ready market for all they can crush. During the last year we purchased sixty horse-cart loads from one man. We had them crushed in a plaster mill; and when about to use them, mixed them with house ashes, and wet the whole plentifully with water. In 48 hours, fermentation having sufficiently progressed, they were applied to turnips, barley and corn; and though we cannot yet speak of their ultimate benefits, they so far confirm the highest opinion entertained of their utility.

We have had some years experience in the use of horn shavings and horn piths, which are procured from the comb manufactories. The first, of which we have used many hundred bushels, are equal, if not superior, to bone dust. The piths are cut into pieces, upon a block, and buried with the plough. Of these we used 15 loads last spring, upon corn ground, and we think we have not seen a finer crop than is now growing there.

From Chambers's Edinburgh Journal.

THE INVISIBLE ANIMAL WORLD.

In whatever direction we turn our eyes, we everywhere see around us the most surprising indications of universality of life. The principal of vitality seems to be scattered with the utmost prodigality over and throughout the whole of the inanimate creation. On the earth, in the air, in the rivers and seas, in all places and in all times, we find life. And in what an astonishing variety of forms and combinations! Reckon up all the varieties of animated creatures from a man to a midge, from a whale to a herring, from an albatross to a humming bird; take the human, the brute, the bird, the reptile, the fish, and the insect creation, and compute the supposable number of individuals in each; and after all that we can count, all that we can allow to be in existence, we are yet but beginning to begin to sum up the amount of creatures whom the Creator in his almighty power has endowed with that incomprehensible principle—life. The deeper we examine, the more lofty are our conceptions of this infinitude of living creatures. Astronomers, by means of their telescopes, have told us of the bodies which dot the firma-

ment, and given us reason to believe that there exist millions of worlds inhabited by beings which must vary in their forms and properties according to the characteristics of the spheres they inhabit. But to bring down our imaginations from the contemplation of so vast a field for conjecture, we are attracted by the discoveries of the microscope, and find, by the attestation of our senses, that in a single drop of water there are myriads of animals—atoms—creatures, of which it would require nearly a thousand millions to form a cubic inch, all recreating and executing their various functions and evolutions with as much rapidity and apparent facility as if the range afforded them were as boundless as the ocean. Where is the man who can contemplate this scene of busy enjoyment, and not be overawed by the majesty of the works of nature, and not adore the hand that has, in such lavish beneficence, scattered the principle of life throughout every department of creation.

Until within the last fifty years, hardly any one was aware of the existence of animalcules; that is, small animals invisible to the naked eye, living in water, and in matter of various kinds. It has also only been within a very recent period that this branch of natural history has assumed a regular form; and though a classification has been in some measure effected, from what we can learn, the science is still in a very imperfect state. When we are made aware of the characteristics of the animalcule world—for it seems entitled to this term—it does not appear astonishing that even the most patient investigators, assisted by the most powerful magnifying glasses, should be at a loss to arrange in distinct orders the apparently innumerable and ever-changing classes.—Animalcules bear no resemblance whatever to animals which we can see with the naked eye. They are of all imaginable shapes; their figures resemble round balls, ovals, eels, snakes, corkscrews, funnels, tops, cylinders, pitchers, wheels, flasks, purses, semicircles, kidneys, dots with tails, tobacco pipes, flowers, branches of trees, eggcups, and some have the appearance of a tulip with a flowery bulb and stalk. But their figures are so extraordinary, so infinite, that it would be quite impossible to give the least idea of them by description. One thing is tolerably obvious: they all possess forms suitable to their peculiar mode of living. If they have to seize their food by darting, they are given a shape in consonance with that object. If they live by creeping, or swimming slowly, they are of a more inert figure. In these respects, therefore, nature has paid the same degree of attention to the construction of animalcules as it has done with larger animals.

The apparently incalculable number of forms of animalcules is not more puzzling to the investigator than their assumption of new forms.—Most creatures that we know of produce young after their kind, either at once bringing forth their progeny in life, or through the medium of eggs, but always producing young resembling themselves in figure. Animalcules, however, have generally a different way of coming into existence. One class propagate by spontaneous scissure, or division of their bodies into two or more portions, each one forming a new creature, which, on its arrival to maturity, pursues the same course. In thus cutting themselves in pieces, they are very

capricious in their fancy. Sometimes they divide straight across, sometimes lengthwise, and sometimes diagonally; and what forms the chief difficulty in understanding them, the pieces so separated do not resemble the original: an animalcule resembling a ball will give birth—if this word can be properly applied—to a number of triangles. Another class of animalcules propagate by the distribution of the internal substance of the parent, of which nothing is left but the envelope, soon to be dissolved; a third class are produced from germs; shooting out from the sides of the parent; and most likely there are many other ways by which they come into life, of which naturalists have yet no knowledge. In some instances, animalcules appear to live in shells, which are bivalve, and open and shut at pleasure.

Notwithstanding the searching power of certain kinds of microscopes, it would have been difficult to ascertain the functions of animalcules without the aid of coloring matter. Into the water in which they abound, coloring vegetable matter, which supplies them with food, is introduced; and being partaken of, the internal structure, now transparent with color, is discerned. By this contrivance, it has been discovered that animalcules possess distinct viscera or digestive organs, and which are of various kinds. Most descriptions of these creatures are furnished with a species of hairs bristling out from parts of their bodies; these bristles seem to serve the purpose of fins to give locomotion, and they also act the part of arms to agitate the water, and cause a current to flow towards their mouths. They are also provided with hooks, by which they can attach themselves to any object. Independently of these peculiarities, some animalcules possess the extraordinary faculty of thrusting out or elongating portions of their bodies at various points, which, assuming the appearance either of legs or fins, are termed variable processes, and enable the creature to walk or swim.

To those who wish to be informed of the already known orders of this wonderful department of nature's handiwork, we would recommend a perusal of the recently published work of Andrew Pritchard, Esq., entitled, "The Natural History of Animalcules." In this interesting production, which has afforded us matter for some of our present observations, the author describes the following as the best method of procuring animalcules whereon to make examinations: "In the selection of vegetable substances for infusions such as stalks, leaves, flowers, seeds of plants, &c. care must be taken that there be no admixture of quinine in them or the intention will be frustrated. Immerse these, whatever they may be, for a few days in some clear water, when, if the vessels which contain them be not agitated, a thin pellicle or film will be discerned on the surface, which, under the microscope, will be seen to be inhabited by several descriptions of animalcules: the first produce are commonly those of the simplest kind, such as the Monads. In a few days more, their numbers will increase to such an amazing extent, that it would be utterly impossible to compute those in a single drop of the fluid. After this, again, they will begin to diminish in numbers, and I have generally observed them supplanted by others of a larger species and more perfect organization; such as the Cycloidia, Paramesia, Kolpodæ, &c. It is worthy of remark here, however, that in their production

they do not pursue any regular order, even in similar infusions. If the vessel be large, and the circumstances under which it is placed sufficiently favorable, a still higher description of animalcules will succeed, viz. the Vorticella, and, lastly, the Brachioni; and thus a single infusion will repay for the little trouble of making it, with a great variety of species. Water in which flour has been steeped will be found to abound also with animalcules; and it is remarked by G. Leach, Esq. that the leaden troughs constantly appropriated for birds to drink out of, contain several descriptions of them, and more especially those of the wheel genus. In ponds, too, especially in the shallow parts, near their edges, and in the immediate vicinity of water plants, prodigious quantities of all kinds may be easily procured; so that, possessing, as we do such myriads of them around us, that they impregnate almost every thing that we eat and drink, touch and breathe, an anxiety to know more about them, and the effects they produce, cannot but be regarded as rational and laudable."

It appears, also, by the investigations of other inquiries, that animalcules may be produced by any species of decomposition, whether of vegetable or animal substances. It would almost seem, from what is related, that the whole of the vegetable and animal kingdoms are but compounds of matter resolvable into these extraordinary minute creatures. An idea of this kind is by no means new, and it will perhaps be remembered that Buffon tried experiments to prove its accuracy. "To discover," says he, "whether all the parts of animals, and all the seeds of plants, contained moving organic particles, I made infusions of the flesh of different animals, and of the seeds of more than twenty different species of vegetables; and after remaining some days in close glasses, I had the pleasure of seeing organic moving particles in all of them. In some they appeared sooner, in others later: some preserved their motion for months and others soon lost it. Some at first produced large moving globulous resembling animals, which changed their figure, split, and became gradually smaller; others produced only small globules, whose motions were extremely rapid; and others produced filaments which grew larger, seemed to vegetate, and then swelled and poured forth torrents of moving globules." The subsequent examinations of physiologists have, in a great measure, determined that these moving globules of Buffon, or molecules, as they are scientifically termed, are the primary atoms of which plants and animals are composed, although, at the same time, we are not yet beyond the regions of conjecture with respect to how these molecules, or animalcula are either brought into substantial consistency, or how they are developed by the separation of matter during the putrefactive process. So intimately does the vegetable, in its earliest rudiments, sometimes bear an analogy to animal life, that it is occasionally difficult to separate them: it is at least certain that the commencement of the vegetable process is some way connected with the existence and operations of molecules. "Having, at the request of Dr. Linnaeus (says Mr. Ellis, a writer in the Philosophical Transactions) made several experiments on the infusion of mushrooms in water, in order to prove the theory that these seeds are first animals and then plants, it appeared evidently, that the seeds were put in motion by very minute

animalcules, which proceeded from the putrefaction of the mushroom; for by pecking at these seeds, which are reddish, light, round bodies, they moved them about with great agility in a variety of directions; while the little animals themselves were scarcely visible, till the food they had eaten discovered them. The satisfaction I received from clearing up this point, led me into many other curious and interesting experiments. The ingenious Mr. Needham supposes these little transparent ramified filaments, and jointed or coralloid bodies (strung like coral beads) which the microscope discovers to us on the surface of inert animal and vegetable infusions when they become putrid, to be zoophytes, or branched animals; but to me they appear, after a careful scrutiny with the best glasses, to be that genus of fungi called *mucor*, or *mouldiness*. Their vegetation is so amazingly quick, that they may be perceived in the microscope even to grow and feed under the eye of the observer. Mr. Needham has pointed out to us a species that is very remarkable for its parts of fructification. This, he says, proceeds from an infusion of bruised wheat. I have seen the same species proceed from the body of a dead fly, which has become putrid by lying floating for some time in a glass of water where some flowers had been. This species of *mucor* sends forth a mass of transparent filamentous roots, from whence arise hollow stems, that support little oblong vessels, with a hole on the top of each.—From these I could plainly see minute globules or seeds issue forth in great abundance, with an elastic force, and turn about in the water as if they were animated? Continuing to view them with some attention, I could just discover that the putrid water which surrounded them was full of the minutest animalcula; and that these little creatures began to attack the seeds of the *mucor* for food. This new motion continued the appearance of their being alive for some time longer; but soon after, many of them arose to the surface of the water, remaining there without motion; and a succession of them afterwards coming up, they united together in little thin masses, and floated to the edge of the water, remaining there quite inactive during the time of observation."

The celebrated botanist Dr. Robert Brown, also entered into experiments of this nature, with the view of identifying the rudiments of vegetable with animal life, which he successfully accomplished. He found that the pollen and tissue of plants were the constituent or elementary molecules or organic bodies. "On examining," says he, "the various animal and vegetable tissues, whether living or dead, they were always found to exist; and merely by bruising these substances in water, I never failed to disengage the molecules in sufficient numbers to ascertain their apparent identity in size, form, and motion, with the smaller particles of the grains of the pollen. I examined also various products of organic bodies, particularly the gum raisins, and substances of vegetable origin, extending my inquiry even to pit coal, and in all these bodies molecules were found in abundance."

Of late, very considerable improvements have been made upon microscopes, by which much interesting information regarding the habits and character of animalcules has been afforded. These microscopes are of immense power in magnify-

ing; and by a contrivance for throwing the light of a bright lamp, of the sun's rays, or of oxy-hydrogen gas, upon the object to be investigated, most astonishing discoveries are made. Mr. Pritchard recommends his Achromatic Engiscope as having certain decided advantages over any other description of the microscope. To the student of nature there could not be presented a more boundless and luxuriant field for useful inquiry than is held out by these powerful instruments; and it will be allowed that in no other department of science is there to be found such a delightful source of leisurely recreation. To the man of humble means we can recommend no better or more rational amusement than a visit to one of the many microscopical exhibitions now to be seen occasionally in every large town, and which cannot be too sufficiently pressed upon public attention.

From the Norfolk Beacon, Oct. 31.

PORTSMOUTH AND ROANOKE RAIL ROAD.

All our readers are aware that the line of the *Portsmouth and Roanoke Rail Road*, between the former place and Suffolk, has been completed some time since, and that the cars for the conveyance of passengers and produce run regularly between the two points twice a day.

We have now to inform them that the grading of the remainder of the route has been contracted for to the distance of about ten miles on this side of Weldon.

The rails designed for the road between Suffolk and the Nottoway—a distance of about 24 miles, are laid along the track; but considerations of prudence, which we are pleased to see, induced the directors of the company to prevent their final adjustment, until the embankments shall have been rendered firm by the rains of the winter. We further learn that some purchases have been made of the land through which the road passes beyond the Nottoway; but that some of the land holders were so exorbitant in their demands, that the directors have deemed it advisable to submit the case to the decision of commissioners, according to the terms of the law. We regret that such a disposition should have manifested itself at this time of the day; the rail road will enhance the value of the land through which it runs a hundred per cent. Such a policy reminds us of the man who charged a friend with a night's lodging, who called to present him with a thousand pounds.

We can, nevertheless, congratulate our friends on the steady progress of the work. Every day the improvement is winning new friends, and confirming the old. Now and then some new obstacles may gather before us; but the goodness of our cause will bear us beyond them. And it is almost reduced to a certainty, that within twelve months from this date, the entire route to Weldon will have been completed; and the Portsmouth and Roanoke Rail Road will demonstrate the successful enterprise of our people.

From the Charleston Mercury.

CHOLERA FACTS.

Since the 12th instant there have been no cases of Cholera on the Savannah river, either in the city of Savannah, or on the plantations. The term of its

continuance from the first case on the 1st of September, was therefore 42 days. The usual term is 57 days.

In the city of Savannah there have been in all so few cases, that the disease can hardly be said to have prevailed there as an epidemic. The immediate site of Savannah is high and dry, to which may be attributed its comparative exemption.

On the river plantations the aggregate number of deaths is computed to have been 700, being a proportion of about one to six of the population. The proportion varied, being more or less upon different plantations. In some settlements it was as great as one to three and four. In New York the proportion was one to twenty-eight.

That our planters should not in case of the recurrence of the disease, be induced, by the temptation of saving a portion of their rice crop, unwittingly to expose and sacrifice the lives of their slaves, it should be borne in mind that those negroes who are kept at their field work, are more liable to be attacked than others. A planter with whom we have conversed on the subject, attributes the reappearance of the disease amongst his negroes, and its going through his entire gang, to the fact of his having continued harvesting, although the workers returned to the pine woods every day before sunset, and were not sent out to work before sunrise. It was thought that avoiding exposure to the night air in the swamps, would exempt them, and we so stated at the time; but it proved otherwise, and although from being promptly and well attended, they nearly all recovered, yet he is convinced from circumstances, that it was the field work which brought on the disease when it reappeared. This fact is in accordance to what is stated concerning the Asiatic Cholera, in the recently published history of British India;—viz: that laborious occupation in the open air was found to be the most potent predisposing cause, and that soldiers after a long march, travellers after a fatiguing journey, and the natives who cultivated the field were the first and usual victims. In the same camp the Cholera would break out and rage amongst the men who had marched, and spare those who had rested. The Europeans, whose pursuits kept them within doors, generally escaped. We learn that in many of the last cases on the Savannah river, the solution of sugar of lead was administered by Dr. Scriven, with decided success, and proved effectual in allaying the internal irritation and checking the diarrhœa.

From the London Literary Gazette.

CONVERSION OF SALT WATER INTO FRESH.

On Monday week we witnessed a completely successful and a very important experiment, made by Mr. Wells, the patentee, in the conversion of salt sea water into a perfectly fresh and pure liquid, fit for every purpose of domestic use and economy. A barge was moored in the Thames near Westminster bridge; and a number of naval officers and scientific gentlemen were invited to inspect the process. The sea water was brought from off Ramsgate, and fully impregnated with the same principle; some of it was in very impure and dirty condition. The apparatus invented by Mr. Wells consisted of a cast iron cooking machine; a cube on a comparatively small scale, especially when we looked to the extraordinary utility of its opera-

tion. It seemed about four feet in height and the same in width; and contained ovens, 'roasting fire,' pots, pans, kettles, &c. &c. &c., sufficient to dress a dinner for seventy or eighty men. The consumption of fuel is very small; about two bushels, we are told, in 24 hours; and yet, by the internal application of the heated air, by means of spiral and circular tubes surrounding the various parts of the machine, roasting, boiling, and baking were carried on with the utmost regularity and precision. Here alone would be a valuable addition to the conveniences and comforts of life, whether ashore or afloat; and, even without the far greater improvement yet remaining to be decided, would entitle Mr. Well's invention to high encomium and general adoption. Whilst the cooking is proceeding, the sea water is gradually supplied from a cask or tank, as may be most ready, and, passing into the interior of the machine, is there submitted to distillation. In its distilled state it then flows into a pipe of cast iron, or of copper tinned, which pipe is led over the bow of the vessel and along the cut water into the sea; and thence along the bottom of the ship till it returns into the hold with a common stop cock to draw off the water. The grand improvement in this, is the making the element in which the vessel floats the condenser of the altered liquid which runs off at the rate of about a quart a minute, perfectly fit for drinking, for washing, and for every other purpose for which fresh water is employed.

We tasted it both before and after undergoing the process, and we used soap in washing our hands with it; and we can truly declare, that in the first instance it was sweet and palatable, and in the second soft and pleasing. The patentee, however, proceeds to filter it through charcoal, in order to restore the carbon which is lost in the distilling, and you have the pure and sparkling element, equal in every respect to spring water. We have thus minutely stated what we saw and tasted; and we do so with great satisfaction, since it is hardly possible to imagine any economic discovery of such vast importance to the navy and to the nation. All the watering of ships rendered unnecessary, and the ocean itself converted into one abundant and everlasting fountain of supply, forms indeed an epoch in the history of navigation. We need here no more of the sufferings of brave and hardy sailors, from the want of this essential article of human subsistence. The room required in merchantmen for the stowage of water for the voyage, may now be filled with goods of any kind. In fine, it would be difficult to overrate the value of this admirable invention, which, there can be no doubt, will be speedily and universally adopted and will we also trust amply reward the inventor of a benefit to his country and fellow creatures, the worth of which can hardly be excelled in the annals of useful humanity. The sea water around a ship is incessantly converted into excellent fresh water, fit for every purpose, and the ocean itself is made the chief agent in this metamorphosis. It is a great and wonderful achievement.

SAVING PEAS AND BEANS FROM MICE.

Chop up the tops of last year's shoots of furze, and sow them in the drill.—*Gardener's and Forester's Record No. 3.*

From the National Intelligencer.

NEW USES OF CAOUTCHOUC, OR INDIA RUBBER.

Messrs Gales and Seaton:—During a late visit of business to the Eastern States, I took an opportunity of examining some of the many public and private improvements made in various places, and as they all have reference to our comfort and convenience, I would take the liberty, through your paper, of giving a brief account of them.

The long known and valuable properties of the Caoutchouc, or India Rubber, has occasioned many attempts to convert this gum into its original or fluid state so as to enable it to be applied as a coating to various surfaces, when its utility would be made more manifest; but the effort long proved unavailing, to any extent, until lately, when the fortunate discovery of a cheap solvent was made by ———, of Boston. The value of this discovery was duly appreciated by the citizens of that city, for a company was soon after formed to enter largely into the manufacture of various articles coated with this gum, and when I visited the factory, it was in full operation, and very extensively patronized.

"The Rubber Factory," as it is called, is situated in Roxbury, a beautiful village about a mile from Boston, and embraces several buildings. One of the proprietors, Captain D——, to whom I had a letter, was fortunately present, and kindly went through the whole establishment with me, except one room, which contained the secret of the mode of dissolving the gum elastic, only known to the inventor, who now has charge of the factory. He prudently reserves to himself the exclusive right of working up the ingredients, the secret being under seal and deposited in bank, in case of the inventor's death. The first room we entered was the lady's shoe factory, where numbers of prunella shoes were making, without the use of either needle or thread, the tops, bottoms, and lining, all cemented together with the rubber. These shoes were of the handsomest shape, and warranted to be completely water proof.

This improvement promises to be a valuable acquisition to the ladies, as they suffer much by wearing shoes that are pervious to water. I was informed that these shoes would last out three pair of the common prunella, and would cost no more.

The next room we entered was the garment factory, where we saw a number of girls cutting out various garments, coats, jackets, pantaloons, &c. and putting them together without thread or needle; the coating of rubber, which they had, forming a perfect cement to the seams. Others were making an article which will be very acceptable to mothers and nurses, namely, waterproof aprons, some of them handsomely ornamented and with pockets.

The third room we visited was filled with men's garments; coats, pantaloons, overcoats, capes, life-preservers, and many other articles, all finished and ready for sale. Here persons may fit themselves with complete suits of waterproof clothes: the sportsman will here find the means to enable him to wade through water and mud without fear of getting wet; the weather beaten mariner, the watchman, coachman, fisherman, may now bid defiance to wet or cold, if ensconced in these waterproof robes; and shipwrecked sailors and others, cast upon the mighty deep, if girt with these life-

preservers, may ride secure upon the mountain wave; and if clad also with waterproof garments, be doubly secure. When Mr. Durant, the celebrated aeronaut, descended in Boston Bay, he took the precaution of girding himself with one of these life-preservers, and to this he said, he owed his safety when he fell into the water.

Several of the steam boats are furnished with these life-preservers, and they serve the additional purpose of a pillow to lay the head on, as they may be folded. They are made to buckle round the waist, being previously inflated, and as they are air, as well as water proof they will remain in that state as long as you may desire.

This is a most valuable article for our public ships, packets, steam boats, and other vessels to possess, in case of shipwreck; as by this means many valuable lives might be saved, which otherwise would be lost.

In one of the buildings up stairs, we found them manufacturing hose for fire engines; small pipes for conducting water above ground, traces for carriages, &c. This hose is made of stout duck, coated with the rubber and cemented with the same; so that neither needle or thread are used. It may be made of any strength as you may treble the thickness of the duck. It promises to supercede the leather hose, being considered more pliable, perfectly watertight, and not so apt to be injured by being trodden upon. I could not but admire the ingenuity of the contrivance of a substitute for the roller to preserve the rotundity of the small pipe, namely, by pumping air into the cavity as they proceeded, so as to keep it expanded. These pipes being made of several thicknesses of duck, remain of a cylindrical shape after being finished.

It is impossible to say to what useful purposes this elastic gum will be applied; it has opened a new era in the arts of life, and from its pliant nature, it must, in many cases, be substituted for leather. To all who are exposed to wet or cold, it proves a safeguard, and its economy is equal to its utility, for at this factory a person may clothe himself in a suit of waterproof garments, of a handsome exterior appearance, for the small sum of eleven dollars.

R. M.

GAMA GRASS.

To the Editor of the Farmers' Register.

A good deal of interest having been elicited by some communications which appeared on gama grass in the first volume of the Farmers' Register, I have thought it might not be amiss to offer a word on that subject. About the 15th of May last, I had occasion to visit in the county of Halifax on Dan River. I found that the gama had been long known on that river by the name of *fox-tail*, that it had been used as food for stock on a small scale, and that it grew spontaneously and luxuriantly wherever it had a fair chance. I was informed by one gentleman that he had cut a small quantity for hay, and that he intended to plant, or had planted, a small meadow of it. I saw it growing in land of ordinary quality—it had attained the height of more than three feet, without the appearance of a seed stalk. On the 18th instant, I accidentally came across two tufts of it growing on a red clay bank on my own farm, which I cut and

weighed. Each tuft covered a space of about a foot in diameter, and they weighed together twenty pounds, after having dropped nearly all the seed, and many of the blades had dried up. The fodder appears to attain its full growth before the seed stalk springs from the root. The blades on the bunches cut, were four feet six inches high, and the seed stalks about six feet six inches. I afterwards found many tufts of it growing on a galled hill-side that had been suffered to grow up in the common shrubbery: on this land, too poor to grow a medium crop of corn, it grew to the height of from four to six feet. I cannot undertake to speak of the merit of this grass as a food for stock. When I rode up to a bunch, my mare eat it with great avidity, and seemed to give it the preference to other grasses that were equally in reach. From the specimens I have seen, I should think it well worth cultivation, for litter for our farm-pens and stables. But if stock will eat it at all in winter, it must be valuable, since no grass I have ever seen can compare with it in luxuriance. It is to be hoped that the judicious and intelligent farmers of this section, will make a fair experiment of it, before they condemn it. It is certainly a coarse grass, but not more so than the ox-grass, which is a good grass if cut early. In this section of the country, where tobacco is the staple, every thing that promises to add to the sustenance of man or beast, ought to be regarded as worthy of attention. If I can possibly find leisure, I shall plant a small spot with the roots, with a view of ascertaining its value as a meadow grass, and make known the result.

September 30, 1834.

C.

Sir—I am instructed by the "Charlotte Agricultural Society," to forward the enclosed communication, (read before the Society,) with a request that you will publish it in the Farmers' Register.

Very respectfully, yours, &c.

A. C. MORTON,
Sec'y of the Society.

Charlotte Nov. 1, 1834.

ON THE MANAGEMENT OF HORSES, MULES, AND MANURE.

The management of the teams of mules and horses, and raising manure, are subjects that deserve and ought to receive great consideration. The capital to keep up good teams on a plantation, together with the annual expense of supporting them, form so great a portion of the charges of keeping up the estate, that no estate however well managed in other respects, can endure for fifty years extreme bad management of the teams, much less when neglect in raising manure is added to it. The good management of teams is often the most obvious cause of the thrift, and increase of wealth of the planter. To their bad management, may justly be charged in many cases, the waste and ruin of the estate. I take up the subject with the full knowledge that I shall not do it justice; but with confidence that I shall call the attention of other members to the subject, who will be able to do more justice to it, and put all to reflecting on its vast importance. The constitution of a horse is said to be very much

like that of a man. He requires a pure air, good water, sound sweet food, and good exercise. He cannot be in full possession of his powers, if either of the above things be wanting. The mule is very much like the horse in constitution. He can endure coarser fare. In addition to the labor of the horse and mule, their dung is valuable as manure. Their management should therefore be such as to get from them the greatest quantity of labor, consistent with their health and longevity, and also consistent with making the most of their manure.

The stable should be situated on a high, dry, and airy place, and if the estate admits of it, on a gray or sandy soil. I should prefer stables built like the stables for race horses, in rows of single rooms, about twelve feet by ten for each horse, with a rack, and a manger that will hold one and a half bushels. The pitch of the stable should be ten or eleven feet, so as to give a plenty of air. I should prefer stables made of logs, notched down as close as convenient, the cracks that remain left open. If the stable is made otherwise, so as to let several horses in the same door, for double rows of stalls, the stable for six horses should be 28 feet long, 18 feet wide, and 12 feet pitch, and with a dirt floor. The stalls should be planked from the floor close to the top. The stall should be 7½ feet long, the hind part about 4½ high, the front reaching to the top of the rack, and the floor so levelled and inclined, that the urine will run out of the stalls into the passage, and from the passage out on each side of the house. The horse or mule to be fastened in his stall, by a chain with a leather strap around his neck. This is cheapest: the strap will last ten years, the chain forever. Ropes will cost less, but must be renewed annually. I object to several horses being loose in the same stable together. Some good managers in other respects, do this. The horses bred together may be quick and disturb each other but little. But generally, when several horses are loose in the same stable together, they disturb each other; and this is more certainly the case with mules. A single restless horse or mule, will deprive all in the stable with him from rest and sleep. Each horse has not only to contend with his own, but with the accumulated filth and stench produced by all the rest. This of itself is an insuperable objection.

Again, it is impracticable to allow each horse or mule with food, when fed in common with others. With the stable should be enclosed from one-quarter to one-half acre of land, covered with turf, and having good shades, and kept as clean and dry as possible. There should also be enclosed another lot adjoining, of several acres, with water, grass, and shade, and in addition, at one side of the small lot a place should be enclosed to carry the dung from the stable: and a shelter to put it under, would be well worth the labor and expense. The stable should have a supply of old spades, or shovels, pronged hoes, forks, &c. and for each pair of mules or horses, a wheelbarrow, and a good curry comb and brush. As our stock of cattle eat all the straw, we have no litter for beds for our horses, except leaves from the forest. A supply of them should be hauled from time to time, and placed in a pile near the stable, and each night the ploughman should put in a good bed to each of his mules or horses, and the next day carry out the whole contents of litter, dung,

&c. down to the dirt of the floor; and carry it in the wheelbarrow to the manure pen, and cover it over with leaves, large piles of which should be kept in the manure pen for the purpose. The whole labor of placing the bed at night, and cleaning out the stable, and carrying the contents the next day to the manure pen, will not occupy the ploughman (there being one to each pair of mules or horses) more than from three to ten minutes. This mode of proceeding will prevent his horses from being stuck up with their own filth, and will enable the ploughman to keep his horses clean with great ease. The usual mode of putting on leaves for the bed of a horse on dung and litter wet with urine, and continuing for a week or more at a time, will destroy the powers of a horse. The stench that rises in such a stable is most unwholesome, and when the heat and fermentation has commenced in the litter under the horse, no matter how well it may be covered by fresh leaves on the top, the steam that rises from it will sicken and debilitate the horse, and often produces scratches and surfeit. In damp warm spells of weather, you will often find the horse smoking with sweat when lying in such a stable. Add to this the lot enclosed, with the stable covered deep with leaves in autumn, and then cattle fed upon it, and all the dung from the stable mixed with this, and a spell of wet weather upon it—no other place out of this filthy stable for the horse to roll and cool himself at noon and night, when he comes in from his work; and take into consideration the labor of the ploughman to clean a horse thus exposed to filth. This mode of treating the plough horses is very commonly pursued, from a belief that it is necessary to tread and mix up the dung from the stable with the leaves in the stable yard, in order to make manure. There never was a greater mistake. Such a course is totally inconsistent with keeping the mules and horses in health and good condition. No feeding and rubbing can keep them up under hard work in such filth and stench. The course is equally inconsistent with preserving the manure. It is held to be a great evil by Sir H. Davy, that wheat, barley, and other straw, is too long to be mixed with the soil and ploughed in, before it has undergone fermentation, as in the process of fermentation it loses its very essence as a manure. He thinks that machines for cutting it short enough to mix in the soil with a plough, might be afforded. This objection does not lie to the leaves, as they are short enough to mix with the soil.

I refer to Sir H. Davy's book on Agricultural Chemistry, Lecture VI. page 184, to prove that vegetable manure should be mixed in the soils before it has fermented, and that it should be kept as dry and cool, and free from exposure to the air as possible. The erroneous practice of spreading leaves and mixing dung, and treading with horses and cattle, cannot be supported by reason or authority. It clearly wastes every thing valuable as a manure about any vegetable substance. This would strike every man at the first blush, when applied to tobacco as a manure. Tobacco, we all know, is one of the strongest vegetable manures. Who does not know that its substance would be wasted by laying it on the ground from November to April, and exposed to the rains and treading of cattle? The same process will injure an oak leaf, not quite as much, because it has a stronger fibre.

The corn stalks, it is admitted, should be trodden: they cannot be converted into manure and mixed with the soil otherwise. The oxen and other cattle can generally manage the whole of them. If, however, the horses are to be fed with, and to tramp a part of the corn stalks, let them be placed in the dung pen in the fall, before any manure is carried into it, and let the horses enter that pen till they have subdued so many of the stalks as is allotted to their share; then pile them up, and during the balance of the winter, throw the dung from the stable and leaves with them, and covering the whole from time to time, as stated above.

As to the feeding of horses and mules, we generally labor under two mistakes. The one is, as to the quantity of grain—the other is, that a plough horse or mule cannot eat too much dry long forage. Horses or mules should never eat as much corn as would produce the slightest heat or fever, or excite a morbid appetite. I should prefer grinding all the corn into homony or meal: it will save about one-third; and is a much safer food—not as liable to produce colic, founder, or fever. One and a half gallons of meal per day is as much as any common sized plough-horse ought to eat. One gallon per day is sufficient for a common sized mule, with hay or fodder, and a small quantity of cut oats. It is much safer to under-feed with grain than to over-feed. And this rule applies as well to the horse of delicate appetite, as the glutton. The horse or mule of delicate appetite, if perchance he gets hungry, and is over-fed, will lose his appetite, and be killed up if kept at work. The glutton, if indulged by over-feeding, will increase his appetite, and will either bloat up with flesh like a whiskey sot, or become a garran, with morbid appetite. In either case is a horse in possession of his powers, a continuance of such a course makes him subject to sudden and violent disease and death. The horse in full possession of his powers, is neither fat nor poor, but at the medium between. If he is fed under what he can well digest, he will decline a little on constant work, but every time he gets rest he will thrive like a pig. As to the quantity of long forage, a greedy horse or mule can, and will, eat too much if given to him. It has long ago been ascertained that a horse with his stomach full of long forage, could not perform in the race or quick draught. It had been ascertained by divers persons, as they supposed, whose letters are to be found in the *American Farmer*, that rye and wheat straw were unwholesome for mules. In reading an English periodical the whole secret was disclosed to me. That work maintained that long forage should be weighed or measured to a horse, &c., and treated of the injurious effects of too much long forage. When the stomach is too full, the lungs have not room to play: this produces a difficulty of breathing. When the horse, &c. is put to work in this predicament his difficulty of breathing soon produces heat, thirst, sweat, and exhaustion. But this is not all: the lungs become diseased in a very short time by being frequently prevented from receiving fresh air and discharging the old. The mule is much greedier than a horse, and will eat much more long forage of the coarser sort than a horse. Rye and wheat straw have perhaps a stronger fibre, and is slower in digestion than any other long forage. This accounts at once why it is that it is supposed to be unwholesome for mules. Notwith-

standing the united statements of the several writers in the *Farmer*, I will venture to assert that both rye and wheat straw will be found wholesome food for a mule or horse, if limited to a reasonable quantity. It is good economy to cut all the long forage for horses, and to feed in the trough without wetting it. Another thing—the horse or mule should not work more than ten hours in twenty-four. He should have as much rest as the day will admit of at noon, consistent with ten hours labor; and while at rest should have every comfort of shade, air, water, feed, and good cleaning. It will be found that ten hours per day in a brisk walk is much more than the quantity of ploughing usually performed. Sixteen miles per day will make four furrows in each row of 4000 corn hills, five feet apart. Those who work an ordinary horse more hours per day, will find the horse in worse condition, and doing less work; and moreover the work is not as good. The plough cuts cleaner, and turns better, and is lighter draught in brisk motion than in slow. Care should be taken that the draught of the plough should never be too heavy for the strength of the horse. A very trifling matter in this respect will do great injury to the horse. It was the last ounce that broke the camel's back. Every planter should breed his own horses and mules. Every person on the plantation then knows all about them. They know what they can eat, and what service they can perform—their good and their bad qualities; and above all, the whole family are attached to them, and are disposed to treat them kindly.

LAWRENCE.

ON THE RUST OF WHEAT, AND OTHER PLANTS.

To the Editor of the *Farmers' Register*.

Prince Edward C. H. Nov. 1834.

With the enclosed amount to pay my subscription, I transmit to you a few remarks on the rust of wheat, hoping that the reflections thus thrown together may elicit inquiry in relation to the subject, and, at least, give something like a systematic direction to future investigations. It was my design to have addressed you sooner, but various hindrances and interruptions, incident to the life of a professional man, have interfered, and forced me to defer it until now; too late I fear, to allow any one an opportunity, (this season) of employing the means of prevention here suggested.

The rust of wheat and rye, had for many years engaged my attention, as a curious subject in the natural history of the diseases of these valuable articles of agriculture. I have never (from any explanation afforded me, of the nature and direct causes of it,) believed that it was fully understood in what manner rust is formed, even by the most experienced of our agriculturists. In the views which are here expressed, my own observation and reflections have governed, almost exclusively. Rust is to be regarded as a disease; and, like several others, incident to the vegetable kingdom, must be referred to the want of a proper balance between the active circulatory, or supplying, and the secerno-nutritive, or secreting and nourishing organs. Wheat and rye are not its only victims. Tobacco, cotton, corn, and perhaps many other vegetables, are also subject to the same, or a similar affection. According to the views here advocated, a close analogy is to be traced between the

rust and several diseases of animals, more especially as regards the manner of their formation. As far as my observations extend, the established belief that extremes of moisture and warm weather are the most efficient causes, is correct. I think rust could not possibly occur without them; but other circumstances, equally important in the production of it, have generally been overlooked, which I will now consider.

Rust never makes its appearance while the plant is passing through its different progressive stages of development and growth, nor do we ever meet with it until the wheat has attained to that degree of maturation, in which the whole fructification, as well as every other part of the plant, is incapable of any further enlargement. The doughy state of the pericarp or grain, is the only stage in which wheat can rust. In this state, the slow and regular supply of sap best answers the purposes and demands of the elaborating organs of the fructification. Should the supply now be greatly augmented by the occurrence of warm damp weather, more especially if it exceed the demands of the elaborating organs, it not only disturbs the function of secretion in the spike or head, but continues to accumulate, until the delicate vessels of the culm or straw, immediately below the head, give way by rupture, and it is the sap discharged by these ruptures, drying and encrusting upon the culm, which forms rust. In this condition, as these ruptures never heal, the necessary supplies to the head must be continually intercepted, and being thus in a great degree cut off, the grain shrivels, and either rots, or becomes so imperfect as to be almost useless. Rust is to be observed in small quantities, more or less, every season—but it only deteriorates the crops of wheat, and thus becomes an object of serious attention, when it forms in large quantities. The black spongy formation which frequently takes the place of the ear, in maize or Indian corn, the smut of the oat, the spots in the ripe tobacco leaf, and the rust of the cotton plant, all result from the same cause, (viz.) want of balance between the supplying and secreting organs, and consequent disorganizations from superabundant supplies of sap.

To remedy these evils, the bedding system, (it has occurred to me,) might be found adequate, and eminently useful. The beds should be so formed and graduated as to prevent the too free, and long continued supply of moisture, which will also effectually guard against the dangers resulting from redundancy of sap. Beds might easily be constructed (on land naturally too moist,) in such a manner as to discharge more readily, the superfluous moisture, by draining and evaporation. They should be arranged with spaces between of sufficient width to allow a horse to pass with ease, and whenever the season is very wet, the furrows should be deepened, and the margins of the beds taken off with a dagon plough, or disturbed with a coulter; more especially about the time of the doughy state of the grain. A new and more porous surface about the margins being thus exposed, and the furrows made deeper, the superfluous moisture escapes with greater facility, both by evaporation and draining. This operation may be repeated several times during the doughy stage of the grain, should the season prove very wet. More danger is likely to result to the wheat crop, from excessive than defective moisture. Dry seasons always pro-

duce wheat of good quality, which compensates for the deficiency in quantity. Seasons wet and cold, rarely ever induce rust, because the low temperature rather retards the circulation, and prevents an excess of sap. For the same reason, rust is seldom met with in cold countries.

The foregoing is at the disposal of the Editor of the Farmers' Register—and as its author (a medical man) does not profess much experience in husbandry, he prefers to write over the signature of

MEDICO-AGRICULTURIST.

ON LEGISLATION FOR THE BENEFIT OF AGRICULTURE.

To the Editor of the Farmers' Register.

* * * * * I trust you will pardon a few remarks and suggestions which shall be thrown out principally in the way of interrogation. I have obtained a "smattering" of information concerning the "Fellenberg School." Would it comport with your designs and inclinations, to lay before the public some more particular account than has hitherto been given with us, of the nature, principles, and objects of that institution? Could not something on the same plan, or with improvements in its modification, be established, with a reasonable prospect of usefulness and success, in Lower Virginia? What is your opinion of agricultural societies and *manual labor schools*? Would it not be expedient to make them the subject, especially the latter, of legislative interposition, and to endeavor, by means of them, to excite in *all our educated youth* a taste for agriculture, and thus unite the advantages of a complete *physical* and *intellectual* education, in those whose talents and influence would be brought to bear with greatest power upon the best interests of the community? For one, I should regard it as ominous of good were *all* our professional men to manifest an earnest solicitude on this subject; I mean the *connection of literature with the pursuits of agriculture*. Would it be consistent with your views of propriety, or with the objects of your Journal, to form, in conjunction with some of your able coadjutors, the resolution to give to the legislature of this commonwealth *no rest* till they shall consent to lend their countenance and patronage to the cause of agriculture? What are our political strifes in relation to the candidates for the presidency, and an hundred other like absorbing themes of petty party animosity and zeal, when compared with *agricultural improvements* in their broad and deep bearing upon the great and fundamental interests of the American people? Trifles "light as air." I have hope from recent events, that Virginia, whose eyes are beginning to be opened, will rapidly advance in shaking off her former disreputable torpor in regard to these things, and that the day is not far distant when she shall be *wide awake*, and perceive with a clear and unclouded vision that *her agriculture and her glory must rise or fall together*.

A LOVER OF HUSBANDRY.

[Our views respecting the necessity for, and importance of legislative aid to agricultural improvement, and the means to be used for that end, concur generally with those intimated by the foregoing queries of our

correspondent: and they have been repeatedly brought forward in former numbers of the Farmers' Register, and will again be advocated whenever the occasion requires it. Perhaps we have said enough—unless the positions which have been assumed in this journal, either are assailed by opposition, or are promised some effective aid from our legislators, or from those who appoint and direct legislators. It will be seen, during the approaching session of the General Assembly, whether any effect has yet been produced. If the *Committee of Agriculture and Manufactures* (which has had a useless existence for some years,) should be properly filled with members who know the proper and important use of such a committee, and have the zeal and ability so to direct its investigations, there might be commenced a reformation of the economical policy of Virginia, which would conduce more to the prosperity of the commonwealth, than all that the legislature has done in the last forty years. If the noble object of promoting the improvement of agriculture was really aimed at by the legislature, the first necessary step would be to ascertain its present state, as affected by political causes—the obstacles to its advancement—and the aids which the law might most readily and effectually bestow to promote its welfare. If the desire was heartily felt by the legislature, it would be all that would be required to lead ultimately to the most beneficial results for the interests of agriculture and of the commonwealth—which, fortunately, are in Virginia identical. Agricultural societies and schools, geological surveys and other means might be used to promote this end—but which do not at this time require more full consideration than has already been given—nor will they, until there is some prospect of such means being brought into operation.]

From the Alabama Intelligencer and Expositor.

IMPROVEMENT OF SOIL BY LEAVES.

If an enquiring mind will go into the woods, where the soil is what we term rich land, and view nature at work, in nature's own way, he will discover readily, that for a considerable depth, this rich soil is a composition of vegetable matter principally, more or less decomposed,—in common language well rotted. He will discover, that what he applies the name of soil to, is composed, almost entirely, of the decayed leaves of the trees with weeds and grass, and rotten wood—perhaps the production of centuries. But on a nice examination of this rich soil, he will be compelled to conclude, from evidence before his senses, incontrovertible, that decayed leaves, form the principal part. If he wishes for conclusive corroborating testimony, he will heap up a mass of them in a pen, sprinkling the mass with lime, and he will find after the process of fermentation, and decomposition has done its office, that the product will, on application to poor soil, produce the finest vegetation, and prove to his senses that it contains the pabulum, or food of plants, in a high degree. By still going on with his experiment, he will find ultimately, that leaves when decomposed, with the aid of decomposing agents, produce an admirable assistant to vegetation, and by forming a mass of leaves, sprinkling the leaves as he forms the mass, with

lime, and adding a small portion of rich moist earth amongst the vegetable matter, he will find, on applying it to the earth for the purpose of aiding vegetation, that he has got a pile of manure.

From this evidence before him he will readily conclude, if capable of the operation of common sense, that for the purpose of littering animals, and as an assistant, in forming a compost manure, leaves, especially if gathered while charged with their whole elementary principles, must be an admirable auxiliary, in the production of the dung-heap, and worthy of being most assiduously collected for that purpose.

Amongst weeds, or green vegetable substances, experiment has amply decided, that those which produced the most putrid and nauseous effluvia, during fermentation, were found producing the most active effect, on the growing crop. This fact seems to settle, by positive proof, the correctness of the theory, of many plants feeding rapidly on gases, evolved during the process of fermentation, through the medium of their leaves. As it would be highly desirable, previous to laying down any plan for making manure, in the form of compost, to have some idea of the relative value of different ingredients, which present for that purpose, it may be proper to have some facts placed before us. Leaves piled up in a pen, with alternate thin strata of swamp mud, when partially decomposed are found a superior preparation for the Irish potato crop. Put around the roots of fruit trees, this compost has been found to produce a healthy and vigorous growth. Its operation has been much increased in its efficacy, by the addition of lime to the mass. The finest Irish potatoes that I have seen produced in a southern climate, were produced by the addition of this compost.

A pen was made with small rails, a stratum of leaves, trampled down to twelve inches in depth, a sprinkling of lime added; after sprinkling the leaves well with muddy water three or four inches of swamp mud was then added, and this course continued, until the pen was six feet in height. This compost was made up in the fall, on the first falling of the leaves, and applied to the potato crop in the spring. The effect on the following crop of corn, was all that could be desired. A second pile was constructed with a stratum of leaves, two feet thick, sprinkled well with lime, previously, with muddy water—two carts came up, the one loaded with swamp mud, and the other with dung—from opposite sides the throwing on commenced, at equal pace, so as to mingle the last two well: on the layer of mud, and manure, being completed, say about four inches thick, another layer of leaves was added sprinkled with water from a pond, then lime, mud and manure, and continued, until the pile was about six feet in height—a little earth was thrown on the top. I am satisfied the same volume of dung, spread over the same surface, would not have exceeded in production, either in the potato or corn crop, that followed, and to which the composition was applied, on planting.—In both cases the manure was applied in the drill, but plentifully. The following crop on both grounds was cotton—it was superior—the seed was drilled in the old corn, and potato rows, opened with a Scooter plough. The following year, the seed that came from the cotton, the year previous, was applied to a second corn crop, which much surpassed the first, indeed was amongst the

finest corn crops to be found—wheat and rye followed and were superior.

I give this detail to show that the efficacy of leaves, is decided, in their action on plants, as a manure, when decomposed: for in the crops above stated, they were the basis of the manure that was applied, it being perfectly impossible for all the dung, and lime, that was employed for the formation of the compost, to have produced half the effect, when spread over the soil, or used as the compost was applied.

PLANTER.

From the Gardener's Magazine.

FOUNTAIN WELLS.

The facility in many, and the certainty in all cases, with which fountain wells may be obtained, promises very great advantages. Besides the water of the clouds, rivers, and lakes, it is had from two other sources; viz. land springs and main springs. The first are liable to fail when most wanted, the second never. Land springs are often found upon, and always at no great distance below the surface of the ground. They are collections from exhalations ever rising from the interior of the earth, and from snow, rain, and other condensations of water from the atmosphere. On these last resources, land springs depend for their existence and supply. What is not quickly carried away by rivers, brooks, and drains, sinks into the earth, but being intercepted in its downward course, by horizontally placed strata of rock or clay, reposes thereon, and from there gradually oozes away at the lowest point of the impervious bed which prevented its sinking perpendicularly. Any shaft or opening sunk into this bed readily admits a flow into it from the saturated soil around, which is then easily obtainable by the pump or bucket. Water so procured, always partakes more or less of the predominating qualities of the soil through which it percolates. Hence the different mineral springs; and hence the various degrees of brackishness, commonly called hardness, of domestic wells.

Main springs are sometimes seen gushing out from the sides, but much more frequently from the bases of high hills. Sometimes they are reached by the common well-digger; but in general they are located at a depth far beyond his reach by any ordinary means. The water of main springs is known by its high temperature; this being always more or less, according to the depth from which they flow; those nearest the surface are about 42° Fahr. increasing to 56° or more. They are also known by their quality, being, in almost all cases freer from impregnation of salts, and are consequently called softer water.

Whether the main springs are supplied from the same sources as the land springs, and that they are less impregnated with salts or other qualities in consequence of their receiving greater filtration in their passage to the depths at which they are found, is a question deserving consideration. But that they do possess the qualities of high temperature and purity, is undeniable, and with these qualities water is invaluable. For the kitchen, side-board, dairy, and still-room, how necessary; in the bath and dressing room how convenient; in the brew-house how suitable; and in the laundry how

profitable. To the gardener it is a useful auxiliary, and to the dyer, &c. most important. In short, the art of forming fountain wells, by which may be gained a constant supply of soft water, without labor or expensive machinery, presents extensive benefits, which are not yet even apprehended. At present we are still ignorant how high such fountains may be carried above the surface of the earth, and how copious such jets may prove. The ascent of water from such considerable depths, is in itself a mystery. When the auger is passed down into a subterranean current or reservoir in a valley, and the water flows up, it is accounted for by saying that the outlet is below the principal source. But when such perforations are made on the highest ground, and where there appears no inclination or fall of surface to the spot, it is difficult to account rationally for such a phenomenon. The natural law for water finding its own level, does not apparently apply. Is it the pressure of the atmosphere? the subsidence of the superposed earth? Is it from the expansive power of subterranean heat, or from the temperature of water itself? or what?

From the [Ohio] Farmer's Reporter.

THE ARMY WORM.

Sir—The devastation committed on agricultural labor, by the different tribes of insects, is such as will probably render the study of their natural history an object of importance to the scientific agriculturist, which induces me to send you the following observations on the army worm, for insertion in the Reporter, if you should not be able to supply us with any thing better on the same subject. Not being familiar with the natural history of insects, nor accustomed to write on the subject, I feel diffident in submitting this paper to the public; but I hope, if you should think proper to publish it, it may induce some one better acquainted with the subject, to furnish a more full account of this destructive insect.

It is probable that there are different varieties of insects called army worms, as I recollect having read, before I became a practical farmer, accounts in the newspapers which differed considerably from each other. I first became acquainted with the insect I am about to describe, ten years ago; but so far as my knowledge extends, they were at that time confined to a few acres of ground, joining a farm about a mile from my present residence. This season they have been more extensively diffused, having attacked nearly every farm in several extensive settlements. Being absent on professional business when they were first discovered in our settlement, I did not see them until they were from a quarter to half an inch in length. When I first discovered the worms, they were slightly hairy, but they became perfectly smooth in the latter stage of their existence. There is little doubt that they change their skins several times, though I observed the change only once, on the 23d of May, when, like others of the caterpillar tribe, their voracity increased; and after this period, when feeding, I could hear a noise resembling that produced by the silk-worm in its latter stages. The worm was beautifully striped on the back and sides with red, yellow, white, and black; but the colors became duller as the worm increased in age, and in its last stage it bore a slight resemblance to

the common cutworm, but was brighter, more active and larger, some of them attaining a size equal to the silk-worm. The chrysalis is naked, bright brown, closely resembling that of the cutworm. The moth is dark ash colored, longer than the silk moth, wings horizontal.

In this account I shall simply detail facts as they took place on my own farm, or under my own observation. They were first discovered in our settlement, by their devastations, on the 14th and 15th of May. I first saw them on the 17th on my way home. When about a mile from home, I observed the timothy belonging to one of my neighbors, had become very black, and on riding up to ascertain the cause, I learned that the worms had eaten the roots in such a manner as to cause the tops to die and dry away; and that he had been burning the dead grass with the intention of killing the worms, but in this he was disappointed, as they fell to the ground on the approach of the fire, and the flames passed over and left them uninjured; the ground being literally alive with them after every vestige of vegetation was consumed by the fire. I ought to observe that the whole country was not covered with them in this manner; they were associated in droves or armies of vast size, and between these armies sometimes a considerable space would be entirely clear. I will confine my account of their progress, to my own farm; and in order to make my account intelligible, I must premise that my farm is laid out in the following order: on the north, a field containing wheat and rye, and in the south west corner a little flax; south of this on the east side of the farm, eight acres of oats; on the west side, a corn field; between these two fields is situated the dwelling house, garden and out buildings; south of these fields is situated a field containing timothy, red top and clover, from necessity occupied this season as a pasture for calves, hogs, and geese; from the south field is a lane, to the dwelling, sown with blue grass, red top, and timothy. The worms were at first discovered in the open prairie east of the oat field, afterwards in the south field and grass lane, and lastly in the rye.

I must now endeavor to give you some account of their motions; during the early part of the day they generally lay still, and commenced travelling about two in the afternoon, and continued travelling and feeding from that time through a principal part of the night. On the 23d they commenced moving towards the field of oats, which set me upon the following mode of ditching in order to prevent their inroads, which I believe is the only mode that can be employed on a large scale, with any prospect of success. I commenced by running several furrows with the plough, one within another, so as to make a ditch about a foot deep, and render the earth mellow and dusty; then take a spade or a hoe, and clean out the loose earth from the bottom and lay it on the side which you wish to prevent the worms rising. When they attempt to climb, the loose earth will give way and they will fall to the bottom of the ditch, where large numbers of them will be destroyed by the heat of the sun; and if a few should accidentally cross the first ditch, another must be made parallel to the first, into which they fall. Where the worms are numerous, these ditches must be cleaned every day, otherwise the worms in attempting to climb, will fill the ditches. I had upward of

two miles of this kind of ditching, by means whereof I saved a principal part of my oats, and could I have completed my ditching three hours earlier, I have no doubt but I could have saved twelve out of sixteen acres of corn which was destroyed. After the worms commence travelling, if they find sufficient food, they only travel a few steps in the twenty-four hours, but if they find little or nothing to eat, they will travel at least a quarter of a mile in the same length of time. Though large bodies of the worms travel in this manner in pursuit of food, considerable numbers never leave the place where they were produced, but for lack of other food subsist on dry grass and even corn husks.

On the 24th, the worms entered the oat field and destroyed about an acre in twenty-four hours, in defiance of every exertion to stop them by ditching, as a slight shower fell in the evening, which appeared to cause them to travel and feed with greater voracity, and the rain dampening the dust on the sides of the ditches enabled them to cross. On the 25th, still moving west of north, they advanced towards the corn field and entered a lane passing between the oats and corn field, as well as passing along the ditches which I was preparing with all possible expedition along the east fence, occasionally a few crossing the first ditch, which rendered it necessary to make parallel ditches. On the 26th, after cleaning the ditches around the oats, the worms being now on three sides, I succeeded about three in the afternoon, in completing ditches along the south and east side of the corn, and hastened to the north side joining the rye, fearing that by this time they might be able to head the ditch on the east. When I got to the rye I found a younger army of worms travelling south from the rye to the corn; and notwithstanding every effort to stop them by ditching, a sufficient number crossed completely to destroy the sixteen acres of corn before the morning of the 27th. The army of smaller worms appeared to have been produced in the rye field, and meeting with the other army now entering the rye from the south east corner they completely destroyed the wheat to the ground, but only took the blade from the chess and rye. The reason of the worms being most severe upon the wheat arose from the fact of my wheat being of a late variety, having at that time shot out no stems, whilst the rye and chess were in bloom; but some of my neighbors who had early varieties of wheat happily had the case reversed, as the worms destroyed the chess and left the wheat but little injured. Flax was likewise considerably injured, in some places completely destroyed; but what is very remarkable, the worms never interrupted any kind of tree or bush, either timber or fruit tree. Red clover was little or nothing injured, but timothy and red top were cut to the ground, and in many places even the roots were destroyed, but the roots of mine were preserved by the industry of the hogs and geese. The hogs likewise destroyed vast numbers along the fences east of the oats and corn; every kind of poultry eat them greedily, and the birds which are generally so mischievous in our corn fields, have this season been permitted to rear their young in peace, on account of their service in destroying the army worm. But notwithstanding their numerous enemies, they were all satiated without destroying the worms; multitudes

passed in the chrysalis state; the hogs continued to feed upon them until the moths came forth in multitudes. But I am going ahead of my journal.

On the 28th, in cleaning out my ditches, I discovered several of the worms in the pupa state, and on the 1st of June most of the worms had quit eating. Our corn fields are now naked, and we are beginning to think about planting another crop, in hopes that the worms will be gone before the young corn makes its appearance. June 6th, the worms are all gone, and some of our young corn is beginning to make its appearance. June 12th, small gray millers are coming from the chrysalis of the army worm.

Now Mr. Editor, I should be glad if either yourself or any of your correspondents can inform me whether or not these worms have a regular period for their appearance; and if they have whether they usually attack the same places, which had been previously subject to their ravages. If they have a regular period of re-appearance, and that period were once accurately ascertained, much of the mischief they occasion might be prevented, by planting upon places subject to their ravages, only such crops as appear to be in a great measure exempt, whilst places where they are not produced might be protected by ditching. In such seasons the corn crop would be better unplanted until the worms are gone.

June 20th. Since writing the above, I have come to the conclusion that the miller of the army worm is probably migratory, as they all disappeared on the night of the 17th or 18th; and those which were kept in close confinement for the purpose of close observation, have all died without depositing any eggs.

Yours,

JOSEPH BRASHAW.

From the New York Farmer.

DOMESTICATING THE BEAVER.

Mr. Editor—In almost every paper which is issued from the public press, we find something noted as an improvement, which is in some way intended to benefit the community, or to turn to individual advantage. Now, sir, as all animals that are valuable for the fur they yield are becoming scarce, owing to the destructive war that is continually waged against them, it is evident that the value of the fur must be enhanced in proportion to the scarcity of the animal. If, therefore, there can be any method devised to domesticate them, it would be of more importance than almost any new enterprise that could be suggested; and as there have been instances of the beaver becoming as familiar and gentle as a common dog, I can conceive no good reason why that most valuable animal should not be entitled to the fostering care of man as any other animal; and for this purpose I would propose the following method: let there be an enclosure, of from one to five acres, made so as to be secure from dogs or thieves, having a brook passing through it. Plant the enclosure plentifully with that kind of shrub or tree that the beaver uses for food, or for building his habitation. Commence by procuring two or more young beavers of different sizes, which being already familiar with human society, and the enclosure being closely connected with the dwelling house, the animal would never become wild; and as they breed rapidly, the num-

ber would soon become very considerable; and if they could not be made to yield their fur without destroying their life, they might be bred in such numbers that they might supply our market with beaver fur as well as it is now with wool from the merino sheep, and make it a much more profitable business, if entered into with spirit by a company.

U.

TAMING THE OTTER.

The Cambridge (Ohio) Times gives an interesting account of the manner in which a Mr. Entz, of that town, has domesticated the wild otter, of the western waters, and made the fur a source of profit by picking it from the body of the animal. Mr. Entz's experience with four otters attests the fact, that each of these animals may be made to realise, according to the present prices of fur, an annual profit of at least fourteen dollars. The otter yields two crops or fleeces of fur a year, which is said to be superior in fineness and gloss to that which is taken from the skin of the dead animal. It is the intention of Mr. Entz to increase his colony of otters, being quite confident he will make the fur trade, thus pursued, a profitable concern. The Times states that it intends on some future occasion, to notice more particularly, some experiments of Mr. Entz in other matters of the same sort. We suppose he alludes to a colony of musk-rats, which we have understood, Mr. Entz has in contemplation.

Several years ago, the editor of the Village Record, (in Penn.) in some remarks on the habits of the beaver, and the perfect feasibility, demonstrated by actual experiment, of taming and domesticating it, suggested a similar plan with regard to that valuable animal, which Mr. Entz has so successfully adopted with the otter.

TOPPING CORN.

[The article containing the interesting experiments of Mr. Clark, which is referred to below, was republished in the 4th number of the Farmers' Register, page 243, but without the author's signature—which was by a mistake of the compositor left out, together with the last paragraph, which was intended to be passed over, because relating to another subject.]

From the [New York] Cultivator.

Experience and science concur in disapprobating the common practice of topping corn. The experiments of Mr. Clark and Mr. Lorrain, which we have published in the Cultivator, go to show that it diminishes the crop; and the principles of science corroborate their report. The corn is nourished by the sap elaborated in the leaves above the ears, and when these elaborative organs are taken away, the supply of food must cease in whole or in part. If fodder is the object, it is far better to cut the whole crop at the ground, when the corn is seared. This mode has two other recommendations: it clears the ground for fall grain, and the corn derives nourishment from the stock after it is cut. We invite our brother farmers, with a view of arriving at a correct result, to do as we intend, that is, to set apart three parcels of corn of similar dimensions, and quality, say three adjoining rows,—to top one part, cut another at the ground, and to

leave the third to ripen with the stalks; and, at the proper time, to husk, measure and weigh the three parcels separately. The results of a dozen such experiments will lead to pretty correct conclusions as to the best method. We not only invite them to make the experiment, but to communicate the results for publication in the Cultivator.

Selected for the Railroad Journal from English Magazines.

PROFITS OF RAILWAYS.

The Stockton and Darlington Railway, which was the first opened in this country for general traffic, has actually multiplied the intercourse between these two towns *forty-fold*.

The shares of the Stockton and Darlington Railway represent £106 paid on each; they are now selling at £299 10s. each. The dividends of the Liverpool and Manchester Railway are limited by Act of Parliament to 10 per cent. (in consequence of the opposition of the great canal interests, against which it had to struggle for existence,) but notwithstanding this the £100 shares are now quoted at £200.

The Liverpool and Manchester Railway conveys now, on an average, about 1,200 passengers daily; which is *triple* the number ever conveyed on the common road during the best days of the coaching system. The quantity of goods transported on this railway has also been constantly on the increase, and falls now little short of 200,000 tons per annum, though it has had to contend in this branch of its business with an unusually strong canal opposition.

That the value of property of every description in the vicinity of railways should have risen amazingly since their establishment, ceases under these circumstances to be matter of surprise. In the course of the evidence adduced before the House of Lords on the London and Birmingham Railway Bill, it was shown that almost immediately after the opening of the Liverpool and Manchester line, the value of the land adjacent to it had risen generally 50 per cent.; and that portions of ground at both extremities, similar to what the Railway Company had purchased for three pence per square yard, could not now be had for less than from three shillings to four shillings per yard, being an advance of full 1,400 per cent.!

From the same evidence it appeared that the Liverpool and Manchester Railway pays on an average one-fifth of the poor rates of all the parishes through which it passes.

Between Stockton and Darlington the charges for carrying goods and passengers have been reduced more than one-half; between Liverpool and Manchester, about one-third.

On the Canterbury and Whitstable Railway—a bad line on a bad plan—the traffic has been increased nearly *eight-fold* within the short period of three years.

The last returns from the Edinburgh and Dalkeith Railway exhibit, in one brief year, an increase of nearly 100 per cent. in the number of passengers, and about 30 per cent. in goods. For 1832, the numbers were—passengers, 91,814; goods, 61,000 tons. For 1833—passengers, 160,000; 80,000 tons.

From the Cultivator.

WHEAT AND CLOVER.

The practice has obtained, in Monroe, Orleans, and some of the neighboring counties, the great wheat district of our state, and is rapidly gaining ground, of alternating wheat and clover, that is, of sowing wheat and clover seeds every other year upon the same ground. This is said to afford not only an increase of crop, but to effect a great saving of labor. The clover is sown with the wheat in autumn, or upon it in the spring. It is mown or pastured the second year, and the lay is then turned over, and wheat and clover again sown upon the first furrow. Thus the grounds receive but one ploughing in two years, and the green manure afforded by the clover, is all preserved for the wheat crop, being dissipated by cross ploughings. Thus, too, the clover promotes the pulverization of the soil, keeps it light and friable, and pervious to atmospheric influence, by its gradual decay in the soil. We are advised, upon respectable authority, that under this practice there is seldom a diminution of crops, and that in some cases the product has been nearly doubled in a few years.

The wheat country of the west is a deep secondary formation,—the earth taken from the depth of ten and twenty feet, often exhibiting a fertility when exposed to atmospheric influence, equal to that of the surface soil. It is a deep deposit of vegetable, animal and earthy matter, abounding in the specific food of the wheat crop. Hence it often occurs, particularly in the oak openings, that tillage, by facilitating decomposition, increases fertility even without the aid of manure. But the question worthy of consideration is, whether the practice of alternating wheat and clover, even upon these fertile formations, can be long continued, without impoverishing the soil? A yoke of oxen may be turned to a stack of hay, and they may continue to thrive; but at length the stack and the food will become exhausted, and without a further supply, the oxen will ultimately become poor and die. The vegetable and animal matter in our western soils is to the wheat what the stack is to the oxen, the food which causes growth, maturity and profit, and constant feeding must exhaust alike both. Although the clover lay affords vegetable food, it by no means makes up for the exhaustion of the wheat crop; and we suspect it benefits more by rendering the soil porous, and thus facilitating the decomposition of the vegetable matter which it contains, than by its own enriching qualities. We have little doubt but this alternation would soon fail on ordinary soils; and we believe it cannot be long persevered in at the west without serious detriment. The banks of the Hudson were once celebrated for their wheat crops; and within our recollection, west Vermont sent as fine wheat to the Troy and Lansingburg markets, and it was their staple production too, as now comes from the west. Now, west Vermont consumes New York flour, her soil no longer producing good wheat in any quantity. And Oneida, too, is no longer distinguished as a wheat growing country; the specific food of this grain being in a measure exhausted in her soil. We are aware that the preceding cases do not afford exact parallels for the west. They are drawn principally from transition formations, while that

of the west is secondary, and is more permanent in its natural fertility. To assume again our comparison, while nature had supplied one with hay *cocks* merely, she has bountifully furnished the other with hay *stacks*; and the result, we think, will be, that though the latter will hold out longer, they are nevertheless, imperceptibly diminishing, and must ultimately be exhausted, as the former have been, by injudicious cropping. Sterility is the worst disease that can afflict a farmer; and the adage teaches, that "an ounce of prevention is worth a pound of cure." It is far better to keep lands in good heart, by a judicious alternation of crops, than to restore them to fertility when they have become exhausted. Upon this view of the subject, our advice to the western farmers would be, that as soon as his circumstances are comfortable, he should cease to sow wheat upon the same grounds every other year, lest he should kill the goose that lays his golden eggs.

From the New York American.

THE WILD HORSE OF THE PRAIRIES.

In the meantime, those of the Indians who had promised horses in the first day of our meeting now brought them up. A young Indian first came forward, and led up a bright, jet black mare—after him followed another, holding in his hand a long buffalo tug, or halter, which restrained the wild motions of a two year old colt; his color was a snowy white, here and there broken with spots of brown. He had been wild in the prairies but a few weeks before. He was a slave, but had never been mounted; his back had never bent to a burden; they led him up in his own native wildness—his tail stood out—his ears were pricked up—his eyes starting—his nostrils expanded—and every hair of his long mane seemed almost erect with an undefinable terror. At one moment he dashed swiftly around at the full stretch of the long tug which secured him—then pausing and shaking his long mane over his head, he fixed the gaze of his almost bursting eyes upon his captor. Then raising his head, and casting a long, lingering, and almost despairing gaze upon the hills of the prairie, which till then had been his home, he made a desperate leap forward, dragging to the ground the Indian who held the end of his halter; but others rushed to his assistance and held him in. The crowd then attempted to close around him, but he reared upon his hind legs and kept them at bay with the rapid and powerful blows of his fore feet.

At length a young Indian, who was standing near, threw off his robe: he crept cautiously towards the animal from behind, and then with a sudden leap he bounded upon his back, and seized the tug which was secured in his mouth. Before this, the efforts of the animal had been violent; but when he felt the burden upon his back, when he felt the curbing hand of his rider, he sent up a shrill and almost frantic scream; his form bounded in the air like that of the active wild cat; he reared, he plunged, but in vain—his rider was a master hand, and he retained his seat as unmoved as if he had constituted part of the animal itself; he curbed him in, he lashed him with his heavy whip until he crouched like a dog upon the prairies; his spirit was crushed; and the last spark of freedom was extinguished. Shortly after, one of

the hunters came up and tied a pack upon his back; he made no resistance; and they led him off with the rest to finish his days in drudgery and toil.

From Silliman's Journal.

POTATOES ON WET LAND.

"In 1796, being in a part of France where potatoes were but little known, and less used, as food for man; and having obtained some Irish seed, I gave them to a country gentleman, at whose castle I was then residing, to plant. He asked me what soil was the most suitable. I informed him that on that subject there were various opinions; but that I had known very good crops, and of good quality, raised on moist ground. He told me that he had one place that was moist enough, being nothing but bog and water; and another dry enough, being nothing but sand or gravel;—and that he was willing to make the sacrifice of these two places for the experiment, since the seed cost him nothing; at the same time saying that he was not partial to Englishmen or potatoes.

"By the side of the morass there was a gravel hill without a sign of vegetable earth in it. The morass was then frozen so as to bear our weight. I proposed to him (or he to me) to use the dry gravel as a mere receptacle to hold the potatoes for vegetation. The plan was adopted; many wheelbarrow loads of gravel were placed at proper distances on the bog, and the potatoes planted therein, under my direction. The result was a very early crop of excellent potatoes, farinaceous and large; and the same process was continued for years after, occasionally adding a little gravel, when a part of the first deposit had sunk into the morass. The potatoes planted on the dry gravel produced a few plants and bulbs of a very bad quality. Their producing any thing must have been owing to the dampness of the climate, and the copious dews that proceeded from the vicinity of the morass.

"Is it not probable, sir, that in New England where good arable land is not in sufficient quantities for our wants, there are many such morasses, now of no value, which might be made to produce potatoes, and perhaps other useful vegetable food? The experiment seems to be worth trying.

"I will further remark that this aquatic potato patch had no hoeing or other labor bestowed on it, —a matter of some importance where labor is so dear. Again the labor of transporting the heaps of gravel may or must be done in the winter, when the time of the farmer is less valuable."

WILLIAM FOSTER.

From Silliman's Journal.

METHOD OF DESTROYING WORMS AND INSECTS WITH SPIRITS OF TURPENTINE.

By M. D. THOSSE.

—I was led to try it by observing that certain plants which have naturally a strong odor, are not infested with insects.

Wishing some years ago to raise four young puppies, I perceived them when a few days old to be very languishing, and discovered that they were full of insects or lice, which were preying upon them. It was in vain that they were comb-

ed—new generations succeeded, or were renewed from the mother, and the little animals were on the point of perishing. I then took into my head to sponge both the mother and the pups with warm water impregnated with spirits of turpentine; and soon found to my agreeable surprise that every turn of the comb brought out numerous dead insects. The little animals soon acquired vigor, and were saved by a single repetition of the process during the course of the summer.

I tried the spirit on various insects. Lice when touched with it on the point of a pin, made a few rotary bounds and fell down dead. Bed bugs anointed with the same fluid, after a few steps, turned on their backs and died. A green gilded insect as large as a bean which attacks pear trees, was touched and died immediately, although another insect of the same kind, lived a long time in warm quick lime.

Butterflies, flies, caterpillars, May bugs, die more or less promptly when attacked with it.

Having learned these facts, I soon found occasion to try its effects on some of my trees, which were attacked by a multitude of worms. These I destroyed entirely by putting into a bowl a few handfuls of earth on which I poured a small quantity of the spirits—then adding water, and stirring the whole together until it had a proper consistence to be rubbed or brushed over the ends of the branches. The insects perish with their germs; and the odor remaining several days about the tree, repels fresh invaders. A mixture of earth is necessary, because spirits of turpentine swims upon pure water and will not mix with it; and if used in too great quantities might burn the leaves.

The drought which occurred a few years ago in the canton in which I live, produced a mangle in cattle and horses, very extensive and injurious; and those which escaped this infection were filled with lice, from which they were promptly relieved by sponging them with water impregnated with the spirits. This infection caused horses fatigued with labor to rub themselves so much against their mangers and the walls of the stables as to deprive them of much of the rest so necessary to their comfort.

I cannot therefore doubt from the trials that have been made, that much benefit might result from the use of turpentine in clearing fields and trees from insects of different kinds; and that a mixture of ashes with which a portion of this liquid has been incorporated, would remove by its odor, the ticks and other insects which infest turnips. Its odor is more penetrating in the open air than that of sulphur, and some other materials used for this purpose.

ON THE PLEASURES OF AGRICULTURE.

To the Editor of the Farmers' Register.

Independent of the actual profits arising from agricultural pursuits, there is something in the cultivation of the soil, eminently calculated to dispose the philosophic mind to serious and sublime contemplation. With your permission, Mr. Editor, as I have seen no communications of this character in the Register, I shall endeavor to show wherein consist the real delights which the philosophic and man of science derive from agriculture. And I undertake this service the more willingly, from

the fact that there are many young men, who from the mere consideration of gain, can never be induced to lay aside their prejudices and become tillers of the soil, but who might be induced to make the experiment, and finally become good farmers, could the subject be presented to them under a pleasing aspect. To those speculative young men who desire amusement as well as profit in their avocations, the present and succeeding numbers I may find leisure to write upon this interesting subject, is respectfully dedicated.

Although the desire of gain is a principal and most necessary inducement to follow the plough, yet all must admit that he who sees no other pleasure in agriculture than that which results from the anticipations of pecuniary profits arising therefrom, is to say the least, a *grovelling and penurious wretch*. There is something really mean and sordid, in overlooking all the beauties of the vernal spring, and the maturing loveliness of autumn, merely to contemplate the amount of *dollars* to be received in return for the daily toil and anxious solicitude of the farmer. Such a disposition reminds one of the folly a man would evince, who should prefer a dark and loathsome cell to the cheerful beams of day, and the pleasing aspect of creation. But to him who looks from nature up to nature's God, and who can recognize the Deity in every expanding, opening flower, and purring rill, agriculture offers charms, calculated to compose the mind, and dispose it to tranquillity and cheerfulness. To such a mind—

“—— Not a breeze

Flies o'er the meadow; not a cloud imbibes
The setting sun's effulgence; not a strain
From all the tenants of the warbling shade
Ascends, but whence his bosom can partake
Fresh pleasure unproved.——”

Who can look upon a field of wheat, gradually rising in vernal loveliness to the delighted eyes of the contemplative beholder, and mark it in all its different stages, until the ripe grain crowns the hopes of the husbandman with a golden harvest of plenty; and then have the heart to distrust the protection of providence, or doubt the existence of an all-wise intelligence, pervading and governing all things; assigning bounds to the elements, and transcribing the limits of nature? There is not a blade of grass or ear of corn, that does not afford matter of curious and endless speculation to the inquisitive and well cultivated mind. And although upon philosophical principles only, no man can ever understand the process of nature, by which the earth in spring is clothed with verdure, and in the autumn filled with her bountiful productions, gradually maturing for the sustenance and pleasures of man; yet the heart by such inquiries must be ultimately greatly benefited. No man who sees, and contemplates the design and wise contrivance of all the plants and vegetables, that clothe and adorn a well cultivated farm, and reflects upon the inexplicable nature of their existence, fructification, and preservation, under so many adverse circumstances, can have the heart to be a sceptic in regard to our holy religion—because many parts of it are surrounded with mystery. He finds that mystery is inscribed upon the face of all things, and what he cannot understand upon principles of reason, he learns to adore as the production of an infinite and incomprehensible Being. The man of reflection sees much to

admire in the great care which nature manifests for her productions, even in the protection she affords to the grasses which cover our meadows and fields. For not only do they clothe and adorn the fields, but they afford sustenance for all animated existence. The leaves afford food for the cattle, the smaller seeds for birds, and the larger for man: for few readers need be informed that the plants producing our bread corn belong to this class. In those tribes more generally considered as grasses, I will mention the following as instances, which appear to coincide with the intention of nature concerning them, viz: their extraordinary means and powers of preservation and increase, their hardiness, their almost unconquerable disposition to spread, and their faculties of reviviscence, each of which qualities, considered in detail, would afford interesting matter for a separate communication. In this, therefore, I can only observe the following things in relation to their general properties. They thrive under a treatment by which other plants are entirely destroyed. In proportion to the consumption of the leaves is the increase of the roots. The more the cattle trample them under foot the thicker they grow. Many of the seemingly dry and dead leaves of grasses revive and renew their verdure in the spring. In lofty mountains, where the heat of the summer is not sufficient to ripen seeds, we are told that the grasses are viviparous, and consequently able to propagate themselves without seeds. It is also an observation frequently made that herbivorous animals attach themselves principally to the leaves of grasses, and if left at liberty in the pasture to range and choose, will leave untouched the straws which support the seed. These general properties of vegetables, or properties common to large portions of that kingdom, are all that the extent of the present communication will allow me to notice, as I am afraid of being deemed too prolix by that class of society for whose benefit I write. But I may here be permitted to ask, whence this admirable contrivance of nature, this adaptedness of the productions of the earth to the peculiar condition in which they are placed, and their perfect subserviency to the uses for which they seem to be designed? Shall we ascribe it to the operations of nature herself? Or looking through nature, shall we discern an ever present and wise Deity, though "invisible or dimly seen in these his lower works," yet superintending and graciously directing all things for the comfort and convenience of his creatures?

In conclusion, I would only observe, that I have just entered the threshold of the ample subject before me. I hope, however, that I have said enough in this communication to impress this general truth, that in the cultivation of the soil there are thousands of objects calculated to expand the mind, increase the understanding, soften the heart, destroy scepticism, and exalt our ideas concerning the Ruler of the Universe. In my next, should the subjects of the present communication come within the design of a journal exclusively agricultural, I will resume the subject more in detail.

W. H. P.

Gillespie's, Buckingham, Oct. 14, 1834.

For the Farmers' Register.

PETITION OF STOCK-OWNERS.

To the General Assembly of Virginia.

The petition of sundry stock-owners, respectfully sheweth:

That one of our most precious privileges secured to us in the by-gone time, by some of your wise and just predecessors, is about to be seriously assailed by that all-grasping, pestiferous class of men denominated agriculturists. We mean—what may properly be called the right of common upon every man's land, who does not choose to enclose it with a fence fully five feet high, according to the requisition of our present most equitable law on that subject. This right you will soon be asked to take away; and our present purpose is, to beg of you as our guardians and friends, rather to extend than to abridge it, even in the slightest particular. We pride ourselves on belonging to the very ancient family called "the Goodenoughs"—famous from a period beyond which "the memory of man runneth not to the contrary," for being the staunch, inflexible friends of all old usages,—the irreconcilable enemies of all changes whatever, of a general nature; but especially of such as are comprehended under that new-fangled term—"internal improvement." We therefore deem it entirely needless, in addressing your honorable body, to take the slightest notice of our adversaries' arguments about the prospective advantages to result from repealing the present law of enclosures, or its incompatibility with the rights of property, either real or personal. It is surely quite sufficient for gentlemen of your intelligence and patriotism to be reminded, that *such is the law of the land*—that *our rights* under it are, of course, *prescriptive*—of very long standing too—that their exercise, according to our free and easy fashion, is sanctioned by that well known law-maxim, "*Consuetudo loci est observanda*;" and that "innovations are dangerous things." Why the law which confers the privilege we now enjoy did not go farther, we have always considered a most unaccountable thing, as it might easily have brought us several steps nearer to that admirable state of nature where "might gives right," towards which so many of our public actings and doings of late years have been most happily tending. For instance, as it gives us the right, in all cases, where a fence five feet high does not intervene, to feed and raise as many horses, cattle, sheep and hogs as we please, on other men's land—a priori it should also have given us the right to raise ourselves and our children in the same way, since human beings belong to a far nobler race of animals, than any of the quadruped genera. Again, it gives us the right, at any time—nay, at all times, to bear off as much of the produce standing or growing on or in these lands, as we please, be the kinds what they may, provided they be not enclosed with a fence at least five feet high; and provided also, it be borne off in the bellies of our stock, instead of being carried on their backs, or in vehicles drawn by themselves, or their owners, which would often be much more desirable. Now, why this over-nice distinction—this very circuitous mode of appropriation? Since the law-makers evidently designed that A might, in the mode specified, transfer to himself, without any equivalent given in exchange, property which once belonged to B C or D E,

would it not have been much better, directly to leave to A himself the choice of the *modus operandi*—in other words, of the particular method of making the transfer? He might sometimes prefer bearing off the produce in his *own belly*, (as in the case of all kinds of fruit,) rather than send his stock to bear it off in *theirs*: or he might choose to convey it away in bags, baskets, or wheel-carriages of some sort or other, either of which he surely should have been at liberty to do, if the privilege that he now enjoys was rightfully secured to him. Again, as we have under the law, this unquestionable right to take (by the agency of our stock as our forage-masters,) not only a part, but the whole of the produce of other men's lands, unless they will be at the expense and labor of protecting it by a fence fully five feet high, why should this right to take what does not belong to us, be thus most inconveniently limited? Why confine it to the immediate produce of land, and to the taking by the mouths and teeth of our stock? If land be really the most valuable species of property, as it is universally admitted to be, why should *that* which is of the greatest value be held by a tenure less secure and exclusive than *that* which is of the lesser value? In other words, why should we enjoy privileges in regard to other men's landed possessions, and not have similar privileges as to their other kinds of property? Why, for instance, should our law compel every land cultivator, who would enjoy the exclusive use of that land, which the law itself so generally calls *his own*, to make a fence around it fully five feet high to prevent other people from using it, and not also compel him to make all his horses, his oxen, his cows, nay, his slaves likewise, of some specified height, to prevent those who own neither from using them also? It would be nothing more than an extension of the same principle which gives us stock-owners the right of raising them on other people's land, and at their expense, whether they consent to it or not. If the latter privilege could justly and equitably be accorded to us, no imaginable reason can be suggested why the former should not also have been granted. It must have been, we presume, what the lawyers call a "*casus omissus*." We therefore pray, that your honorable body, instead of granting the petition of our adversaries, by repealing the present law relative to enclosures, will so alter it as to subject to our use, every land-owner's horse, ass, ox, cow, sheep, hog, or slave, until he will make each of them such a standard height as you may deem most advantageous to us to establish. And we farther pray, that another provision be inserted in the new law, giving us the privilege of bearing off, in whatever mode we please, any part, or the whole of the produce growing on other men's lands, instead of restricting the method to deportation in the bellies of our stock: provided the said produce be not enclosed by a fence of the full height of *six feet*, carpenter's measure, the present standard of five feet having been ascertained by long experience, to be quite too low for some of our most valuable horses and cattle, which, from unavoidable starvation at home, have been driven to the necessity of learning to leap with inconceivable ease, over all such paltry enclosures as do not much exceed the height required by the present law. *This* was passed, as we hope your honorable body will remember, when lands were

cheap, plenty, and productive; when our stock were not, as now, driven to their wits' end, to gain an honest livelihood; and when a leap of five feet high over another man's fence, was an achievement of far greater difficulty than one almost of seven feet would now be. Justice, sheer justice, consequently demands, that the law of enclosures, if changed at all, should be so altered as to accommodate itself to the increasing exigencies of stock-owners who have either no land at all, or not enough to support as many cattle as they wish.

All which we respectfully submit to the wisdom and patriotism of your honorable body.

TO MAKE TOMATO CATSUP.

Boil tomatos, full ripe, in their juice, to nearly the consistence of pulp, pass them through a hair sieve, and add salt to the taste. Aromatize it sufficiently with cloves, pepper and nutmegs.—*Cultivator*.

RAILWAY TO CONNECT THE MISSISSIPPI AND CHESAPEAKE.

Report of Col. H. S. Long, United States Topographical Engineer, to Gen. E. P. Gaines, and forwarded by him to the Columbia Rail Road Company, with the accompanying letter.

Amabena, near Memphis, Ten., Sept. 4th, 1834.

Gentlemen:—I take much pleasure in transmitting for your information a concise report of this date by Col. H. S. Long, of the United States Topographical Engineers, containing a brief exposition of the prominent features of the country recently examined by him, through Middle Tennessee, between Memphis and the *White's creek Gorge* of the Cumberland mountain, near Kingston, East Tennessee—and of the principal difficulties to be encountered in the construction of a rail road in that direction—with a view to its extension to Harper's Ferry on the Potomac, and thence to Baltimore, Md., or Washington city, as well as from some suitable point on said rail road, to Richmond, Va.

The report speaks for itself. Emanating as it does from an experienced head and sound heart, devoted to the true interests and honor of our beloved country, it cannot fail to awaken the latent energies and enterprise of our brethren and neighbors of the hills and dales to be subdued and decorated and enriched by the proposed great work of internal improvement.

It is scarcely necessary for me to add that, I must cordially concur with Col. Long in the views which he has taken of the feasibility, importance and expediency of the proposed work, and the ways and means by which it may be constructed without burdening any citizen of the United States with an oppressive, or even an inconvenient exaction. I am moreover of the opinion that the work might be and ought to be commenced in the ensuing year, as soon as the surveys can be made, and the best possible location ascertained: and that it may be completed within the ensuing five years, without the imposition of a tax of one dollar on any citizen, excepting only the legally authorized *tolls for transportation on the rail road* after its

completion;—provided the government of the United States will favor the work by the proposed loan; or by a liberal donation of wilderness lands such as have hitherto been made for the encouragement of other (and far inferior) works of internal improvement, to be proportioned to their relative extent and importance—mile for mile, or upon a fair estimate of their relative value.

With such a rail road about the middle of August, 1814, our beloved President Madison might by the 24th of that month have availed himself and the nation of the services of 50,000 of our Tennessee, Kentucky and West Virginia sharpshooters; 5000 of whom would have annihilated the British army in its approach to Bladensburg, saved the Capitol and the honor of Washington, and would then have formed the rear guard of this rail road maiming veterans in Canada, might have visited Montreal and Quebec in time to have taken, or confined to their own strong holds all the British forces in Lower Canada;—and lives there a man who calls himself an American citizen, who would not willingly raise his voice in favor of the faithful distribution of twenty-five millions of dollars of public money among the industrious and virtuous mechanics and farmers of the isolated villages and towering mountains, for the construction of the proposed rail road, rather than to leave it in the power of an invading foe again to destroy our national archives! or again to dishonor the land of Washington?

I need not pause for a reply, when it is known that this expenditure, in place of its being employed in the construction of fortifications, or in the embellishment of palaces, demanding as they do a constant heavy expense, without any advantage to agriculture or domestic manufactures, or inland commerce, except in a state of war—will contribute in peace and in war to diffuse throughout hundreds hitherto isolated villages and settlements of rich lands, all the benefits without any of the evils of the immediate vicinity of large sea-port towns—benefits which the narrowest minds will comprehend when they see a horse—a single horse—hauling with ease at the rate of 40 miles a day, a load which 40 horses with ten wagons would scarcely be able to move at the rate of 20 miles per day;—or when they see a corps of disposable force—which corps, aided by our few *never tiring, mettlesome steam couriers* running at the rate of 30 miles an hour, with a cargo of more wheat, or corn, or meat, or men, than 100 horses can haul, at the rate of three miles an hour!—benefits which in a state of war will contribute to render this nation impregnable—by bringing within the short period of four or five days any and every disposable warrior and supply from all parts of the interior States and districts to the national frontier.

Napoleon, at the head of a French army, triumphed over the best troops of all the nations opposed to him for many years in succession, simply and mainly because he discovered and profited by the great secret of marching six miles further in 24 hours than any other, the best troops of Europe, had usually marched. Hence it was he always attacked his enemy an hour or two before they were quite ready for action. Rail roads and steam power will enable us, so long as we are content to confine ourselves to *defensive war*, to give to the world the first irrefragable evidence—of a

Republic the power of a nation—to prove itself to be absolutely impregnable. And this may prove to be the first step taken in christendom towards a millenium, because it presents the only obvious and certain means (a miracle excepted) by which war must be forced to terminate, and no longer to exist.

Having had the satisfaction of a free interchange of views and sentiments with the committee whom you did me the honor through another committee to say would visit Memphis, and who were accompanied by the President and two members from the rail road company at Jackson; the citizens of Memphis generally are pleased with the visit, and they concur with me in the opinion that the interests of each company will be greatly sustained and promoted by occasional meetings and conferences of a similar kind.

The apparent good temper which characterised this meeting could not but be particularly gratifying to those who had long been impressed with a belief that a co-operation and harmonious concert, extending to every point and to every individual interested in our intended great public works, was essential to insure our success.

Embarked as we are in measures of enterprise, which, in a *state and national* point of view, is, in all its vital parts the same—an enterprise in which we know that we can contribute—not indeed to annihilate space and time—but at least to reduce to an unparalleled limit the usual time and expense of moving men and all kinds of movable things—in war and in peace;—an enterprise in which like the officers and seamen and mariners of a ship at sea, we may have in view different kinds of gain or trade, and all may look to ulterior objects of a different character to be attended to whenever the voyage terminates—yet we are alike deeply interested in the safety of the ship, and success of the voyage. Hence we cannot too often or too earnestly admonish ourselves to take for our rule of conduct the *axiom* by which our fathers were borne triumphantly through the war of the Revolution. “United we stand—divided we fall.” Our enterprise is one which without the hearty co-operation of each other, we cannot for many years to come accomplish. We must act in a manner calculated to inspire the confidence of our neighbors, and for this purpose we must be faithful to ourselves and to each other. If they find us to be consistent—if they find our plans to be the result of mature deliberation and prudent circumspection—and moreover, if they find our measures of execution judicious, and marked with strict economy, industry and perseverance, we shall inspire the confidence of all who see and know us, and they will help us—and we shall triumph over all difficulties;—but, if on the contrary, they find us cut up into opposing factions, filled with a spirit of rivalry, or local prejudices, or sectional antipathies—endeavoring to counteract or cripple each other—or making weight to throw into the scale of some political favorite or demagogue, we shall in this case fail to accomplish any thing worthy of ourselves or our country—we shall be abandoned, and we shall deserve to be abandoned by the virtuous and the wise of our own and our neighboring States. My deliberate opinion as often hitherto expressed, and my constant rule of conduct has been and will continue to be in accordance with the foregoing views.

I am gratified to have it in my power to inform you that our subscription books embrace a very substantial list of subscribers to the amount of considerably upwards of 300,000 dollars.*

EDMUND P. GAINES.

REPORT &C.

Sir:—In obedience to your instructions of 2d ult., I have examined the country between this place and the easterly base of the Cumberland mountain, in East Tennessee, with the view of ascertaining as nearly as practicable from personal observation, the feasibility of a rail road in that direction. The time and means at my command and applicable to this service, were far too limited to admit of an examination so minute and multifarious as the great extent and diversified aspect of the country would seem to demand, yet the results that have been attained are even more favorable than could reasonably have been anticipated, though less satisfactory and conclusive than those in which a more protracted and costly examination might have led.

I now submit in conformity to your request, a brief exposition of some of the more prominent features of the country examined, and of the principal difficulties to be encountered in the construction of the contemplated rail road, leaving such details as I have been able to collect in reference to the subject, to be embodied in my general report on the several examinations in which I have been engaged.

The route under consideration is to be regarded as a portion of a grand route, extending from the head of Chesapeake Bay to the Mississippi river, and may be designated with propriety by the name of the Chesapeake and Mississippi Rail Road, connecting the largest bay within the United States with the largest river in the world. The entire length of the route will be nearly 1000 miles. On a portion of it a rail road has already been constructed by the Baltimore and Ohio Rail Road Company, viz: from Baltimore to the Potomac river, about 70 miles. On another portion, viz: from Harper's Ferry to Winchester, Va., a rail road is in the progress of construction—surveys have moreover been extended through the great valley of Virginia to the Tennessee line, near Bluntsville, and a rail road has been pronounced practicable on this portion of the grand route. A personal acquaintance with the valley of Tennessee from the Virginia line to the easterly base of the Cumberland mountain, convinces me that a rail road is equally practicable on this portion of the route, which will terminate in the valley of the Clinch river, near the confluence of Emery's river with that stream. The valley region just alluded to, viz: the valleys of Virginia and Tennessee, present no uniform, continuous or direct valley route, but a succession of valleys or glades, intervening between the numerous insulated hills, and ridges of greater or less magnitude, with which these valley regions are studded, and amongst which, although I have never examined the country with a view to the choice of a route for a rail road, yet I feel persuaded from a general knowledge of its aspect, that a route favorable for a con-

tinuous rail road, leading from the mouth of Emery's river, on Clinch to Harper's Ferry on the Potomac may be found, and shall presume on its practicability till the reverse shall have been established by actual survey. The principal difficulties to be encountered on such a route will probably consist in numerous deep cuttings and perhaps occasional tunnels, in passing from one valley or glade to another, and occasional plains inclining at an angle of about one degree in crossing the principal ridges. I have been informed that a route nearly direct leading from the valley of the Roanoke to the summit of the Alleghany mountain has been surveyed by Capt. Crozet with an uniform ascent of one degree, or 92 feet per mile.

Ascents of the character just mentioned are contemplated to be overcome by the aid of teams of horses or mules stationed at the foot of the plain, and kept in readiness to aid the locomotive engine in conveying its load upward, to the summit of the plain. On arriving at the head of the plain the team may be detached from the train and placed in stable cars fitted for that purpose, in which they may descend to the foot of the plain and be in readiness to ascend with the next train.

With respect to the route from Memphis on the Mississippi, to the easterly base of the Cumberland mountain, my late examinations and the information I have been able to obtain from persons well acquainted with the aspect of the country traversed by different portions of the route, are more definite and conclusive, and I now take occasion to present a summary of the results to which they have led, and which are as follows, viz:

Commencing at Memphis, the route proceeds in a North Easterly direction to a point near Jackson, the distance being 85 miles. This portion of the route has been surveyed by Mr. J. Thompson, and has been found practicable at a gradation of 30 feet per mile without incurring excavations or embankments on any part of it more than 20 feet deep, while by far the greatest proportion of the route is on level ground. Extensive causeways will be required in order to pass the valleys of Wolfe, Big Hatchee and Forked Deer rivers and their branches.

From Jackson the route proceeds Easterly, pursuing the valley of the middle fork of Forked Deer river to its head, there crossing a low ridge, by means of cutting about 20 or 25 feet deep for a short distance and thence descending through the valley of Beech river to the Tennessee river. This portion of the route embraces a distance of about 51 miles, is remarkably direct and passes over bottom land, for the most part secure from inundation, and affording a very easy gradation both with respect to inclination and road formation.

The Tennessee river must be crossed by a bridge or viaduct 350 yards long, with causeways of considerable extent leading across the bottoms on either side of the river.

From Tennessee river to the valley of Bigby creek two routes are presented, of the following characters.—*First*, a route leading upwards in the valley of Cedar creek, to its head in Buffalo ridge, which is about 200 feet high, passing through the ridge by means of a tunnel 700 yards long, thence crossing Buffalo river, and pursuing the valley of Sinking creek to its head, thence descending by a ravine, crossing Trace creek on a

*[The numerous errors in the foregoing letter are in the newspaper copy from which this is taken, E. P. FARM. REG.]

high bridge and causeway and ascending in another ravine to its head, thence descending in a ravine, crossing Little Rock-house creek on a high bridge and causeway, and ascending in a ravine to the surface of a tabular plain called the Barrens—thence along the Barrens, on ground nearly level, to the head of a considerable branch on Bigby creek, and thence down the ravine of the branch, to the valley of Bigby creek—cuttings of considerable depth will be required at the ridges crossed by this route: and in order to surmount the ridges, plains inclined at an angle of about one degree, on which as before remarked, horses or mules may be employed, may be necessary appendages.—*Second*, a route leading from the Tennessee upward, either in the valley of Cypress or of Brush creek as far as it can pass at an inclination of 36 feet per mile; thence ascending Buffalo ridge by means of an inclined plain for stationary power—thence crossing the crest of the ridge by a cut of 40 or 50, perhaps 60 feet deep; thence crossing a depression, the depth and width of which are not known, which serves as a channel for part of Buffalo river when swollen with a flood, and which must be crossed by a bridge of greater or less height and extent; and thence along the Barrens, on grounds dividing between the sources of Sinking, Trace, Little Rock-house, Grinders, and Pond creeks on the south, all of which fall into Buffalo river and various tributaries of Duck river on the north. The route will of course be serpentine in its passage along the dividing grounds above considered, but it is believed that it will be found nearly or quite level. Having pursued the dividing ridge as above, the route may descend into the valley of Bigby creek by the ravine of one of its branches, and at a declivity not exceeding one degree.

On this route the crossing of Buffalo river will be greatly facilitated by means of a natural bridge or causeway, beneath which is a subterranean channel large enough to admit the free passage of the entire river when not swollen by freshets.

My belief in the practicability of this route, is grounded upon information given me by a gentleman who has travelled over most of the ground, and whose statements and opinions are entitled to full confidence.

The distance from the Tennessee river to the valley of Bigby creek by either of the routes above considered, may be estimated at 50 miles.

From the point at which we enter Bigby valley, the route leads through a valley country in which Mount Pleasant and Columbia are situated, and which is characterised in a remarkable manner, not only for the richness of its soil, but from the multiplicity of insulated hills and ridges with which it abounds, and between which are to be found easy passes for a rail road, at the expense of moderate cuttings in the higher parts of the valleys, and slight fillings in those portions that are less elevated. On leaving this beautifully variegated tract, the route proceeds upward in the valley of Duck river, passing through a succession of extensive glades, many of which are clad in a dense growth of red cedar of superior quality. The route will probably cross Duck river several miles below Shelbyville, and lead through a large tract of level country denominated the Flat-woods, and pass thence over ground somewhat broken, for a few miles, to the valley of the Garrison Fork of Duck river, near the confluence of M'Bride's and

Noah's creeks. The grade on this portion of the road may be effected at a rate no where exceeding 36 feet per mile, at a moderate expense of excavations and embankments.

The distance embraced by this portion of the route, viz: from the entrance into Bigby valley to the junction of M'Bride's and Noah's Forks or creeks, is estimated at 68 miles.

From the point just mentioned, the route proceeds upward in the valley of Noah's Fork, about eight miles at a grade not exceeding 36 feet per mile, and then in a distance of about two miles, rises to the surface level of the Barrens, upon which it tends eastwardly upon favorable ground to Charles' creek, and thence downward on ground quite as favorable, either in the valley of Charles' creek, or on one of the ridges adjacent to it, to Collins' river which it must cross on a bridge 50 or 60 feet high, and about 120 yards long, besides the causeways on either side of the river connecting the bridge with the high lands. From Collins' river the route continues its eastern course on ground less favorable, for the distance of about 10 miles, crossing Rocky river by means of a bridge about 100 feet high and 200 yards long, which will be necessary in order to maintain an elevation adapted to the general level of the neighboring country.

The distance on this portion of the route is estimated at 43 miles, which carries us to the point at which we begin the ascent of Cumberland mountain. The road may be graduated at a rate no where exceeding 36 feet per mile, except at the horse plain leading from the valley of Noah's creek to the summit of the Barrens, which as before remarked will have an inclination of about one degree.

The last and most difficult portion of the route examined is the passage of the Cumberland mountain, the ascent of which, on the west side, must be effected by means of two inclined plains, with stationary power, and the descent on the east side, by means of a plain descending at the rate of 40 to 60 feet per mile, the operation upon which may be similar to that upon the Sutton and Rain Hill plains of the Liverpool and Manchester Rail Road. To these difficulties may be added perhaps, that of a horse plain, at an inclination of about one degree, for a distance of about three miles on each side of the summit ridge of the mountain. With these exceptions the route may be graded across the mountain at a rate not exceeding 36 feet per mile, at the expense of cuttings and fillings of considerable depth, at a few places, and occasional high bridges of moderate length, in four or five instances.

The leading features of the route across the Cumberland mountain are briefly as follows:—An inclined plain with a lift of about 150 feet, and an inclination of about four degrees; then a level of about three fourths of a mile, on a bench of the mountain; an inclined plain rising about 400 feet, at an angle of five degrees. This plain as well as that above mentioned, will be straight, and may have its stationary power located midway of the plain, where water may be had to supply a steam engine. From the head of this plain the route will pass on favorable ground for a distance of four miles, where it must cross the Dry Fork of Cainy creek on a high bridge. The route proceeds thence past the sources of Fall and Piney creeks

tributary to the same, about 10 miles, on variable ground requiring much excavation and embankment in places, and then crosses Cainy creek, which requires a bridge about 60 feet high, and 250 or 300 yards long. The ground continues rather unfavorable for a distance of about 2½ miles further, when we enter upon extensive glades with a slight undulating surface, over which the route passes for a distance of about 12 miles. We next ascend to the Bee creek summit by a horse plain, rising at an angle of about one degree, in a distance of three miles, where we reach the highest part of the mountain traversed by the route. From this summit we descend about two miles, at a similar inclination, and then pursue a North easterly course, descending at the rate of 40 to 60 feet per mile, till the route crosses Daddy's creek, which must be done by means of a bridge 50 or 60 feet high, and perhaps 300 yards long. The route proceeds thence on a level, or nearly so, three miles, to the head of Crab-orchard creek, and thence down the ravine of Crab-orchard, Piney and White's creeks, by a meandering course, and descending at the rate of 40 to 60 feet per mile, for a distance of eight miles where it leaves the mountain and enters the Tennessee valley; at a point 10 miles distant from the Post-oak spring, or by estimation, 18 miles from the mouth of Emery's river, between which, and the point at which the route reaches the easterly base of the mountain, there is a continuous valley route.

The ravine through which it is proposed to carry the rail road from Crab-orchard to the base of the mountain, is narrow, rugged and rocky, but according to the best information we could get from persons who have explored it, the valley is generally free from short curvatures, and of nearly an uniform declivity. The road formation on this part of the route will of course be expensive.

The distance by the route from the westerly to the easterly base of the mountain is estimated at sixty miles.

Hence the entire distance on the proposed route from Memphis to the Easterly base of the Cumberland mountain, is 358 miles.

It is to be presumed that the route above designated has the best approximate locality, in every part: on the contrary minute examinations which it was not in our power to make, may show the propriety of very considerable deviation; it is nevertheless confidently believed, that no general route can be found, leading in the same direction, and traversing this exceedingly diversified, irregular and broken portion of the country, that can have any fair claim to a competition with the route described.

In the selection of a route no regard has been paid to sectional interests or local accommodations. There is not a single town or village in the whole line likely to be invaded. The only considerations that have governed the choice, are shortness of route, cheapness of construction, and facility of transportation.

In connexion with the above route, numerous branches leading to important points are deemed practicable: among the most important, probably is a branch, connecting with the main road in the Barrens, near the head of Charles' creek, descending about 500 feet into the valley of Stone's river by one or more inclined plains, and proceeding

thence along the valley of Stone's river, which is remarkably favorable for a rail road, to a point near Nashville, and thence by the most favorable route to some point on the Ohio river suitable for its termination.

Other branches of less extent may lead from the main stem, to the several towns and villages situated in the neighborhood of the route—for examples, to Sommersville, Bolivar, Brownsville, Jackson, Lexington, &c. in West Tennessee—to Mount Pleasant, Columbia, Farmington, Murfreesborough Shelbyville, McMinnville, &c. &c. in middle Tennessee—and to such other points as may be deemed advisable.

The main route extended to the line dividing between the States of Tennessee and Virginia, embraces an additional distance of 162 miles further, making the entire route within the State of Tennessee 510 in length.

The distance on the route from the Virginia line to Harper's Ferry on the Potomac, is estimated at 394 miles, making the entire distance from Memphis to Harper's Ferry 900 miles.

The distance from Harper's Ferry to Baltimore, on the Chesapeake Bay, is about 80 miles, making the length of the entire grand route from the Mississippi to the Chesapeake Bay, 985 miles.

The range of the Alleghany mountains, which is pervaded almost throughout its whole extent by this extensive route, has been very appropriately denominated the Back-bone of the United States. The contemplated rail road may with equal propriety be denominated its spinal marrow, alike essential to the protracted vitality of our confederacy, and to the healthful condition of its several members.

The cost of such a work will no doubt be very great; amounting to between 20 and 30 millions of dollars.—But it is believed that the means of its accomplishment may be obtained without serious inconvenience, either to the community or to individuals; and I here take leave especially to suggest the manner of procuring them.

The United States now pay annually for the transportation of a daily mail weighing less than half a ton, one hundred and twenty-five dollars per mile, the daily distance being only 70 miles.

This annual expenditure regarded as interest at four per centum, the rate at which government loans may be effected, answer to a capital of \$3125 for each mile, or \$3,078,125, for a distance of 985 miles, the computed length of the contemplated rail road.

For the transportation of a mail the weight of which does not exceed half a ton through a daily distance of 200 miles or nearly three times the present daily distance, the United States can afford to pay double the price above stated, viz: \$250 per mile annually, which is equivalent to an interest of four per cent., on a capital of \$6250.—This sum for each mile on the entire distance from Baltimore to Memphis, 985 miles, will give for the aggregate amount \$6,156,250.

Let the companies organized and associated for the construction of the road borrow this amount from the general government, giving proper security for the payment of interest thereon, till such time as the road shall have been completed; and for the subsequent transportation of a daily mail of the weight and through the distance last mentioned:—and in addition to this amount, let the associ-

ated companies also borrow of the general government \$3,443,760 more at the same rate of interest till the completion of the work, obligating themselves to cancel this debt by transporting for the U. States, at the ordinary rates established for the road, troops, arms, and other military stores, Indian supplies, &c. on any portion of the road through which such transportation may be required.

The sum thus obtained of the United States will amount to	\$10,000,000
Probable amount of subscription on the part of the State of Virginia	3,000,000
Do. do. on the part of the State of Tennessee	3,000,000
Do. do. on the part of the Baltimore and Ohio Rail Road Company	2,000,000
Do. do. on the part of individuals in the State of Virginia	2,000,000
Do. do. on the part of individuals in the State of Tennessee	2,000,000
Do. do. on the part of individuals in other parts of the United States	3,000,000
	\$25,000,000

via twenty-five millions of dollars, which is believed to be sufficient for the construction of a double rail road, of the most approved, substantial, efficient and permanent character.

As a means of reimbursement for the heavy expenditure, in addition to the transportation of the United States mail, we may safely count on the daily transportation of at least 15 passengers in each direction, and on the conveyance of freight to the amount of 150,000 tons annually in each direction.

In conclusion, I beg leave to signify my acknowledgements of the kind attention and assistance rendered by gentlemen of the Jackson and Mississippi Rail Road Company, and to the Columbia Rail Road Company, and particularly of the personal aid bestowed by Gen. Brown and George W. Skyles, Esq., the latter of whom accompanied me through the entire route.

I have the honor to be, sir,

Very respectfully,

Your obedient servant,

H. S. LONG,

Pop. Eng. Co. Ill. Cal.

BRANDS-CHAMBERLAIN

From the New England Farmer.

There has been a late discussion of the merits and value of the various systems of the growing of flaxseed, and other crops, and it is very curious to find, in the course of one year, that the same system has been advocated by one year, and then by another year. Some of the systems are very old, and have been in use for many years. The crops of flaxseed are very important, and it is very important to know the best system to use.

we conclude that the Shakers and other purchasers know what they are doing.

FRENCH AGRICULTURAL PUBLICATIONS.

We have just now succeeded in obtaining the first supply of periodical publications on agriculture from Paris, after ineffectual efforts for more than a year; and after much trouble incurred, and with much expense, compared to the object, it is believed that the arrangements now made will henceforth keep us regularly and speedily supplied with some of the latest French periodicals, and enable us to present to our readers whatever articles they may furnish worthy of notice, either for their intrinsic value, or merely for their novelty. Our supply of British periodicals is more directly obtained, and with very little delay, by the line of James River and Liverpool packets. The work which we formerly obtained from Belgium, (*the Journal d'Agriculture des Pays Bas*), has ceased to be published, in consequence of the disorders of trade, caused by what our Belgian correspondent calls their "stupid revolution."

AGRICULTURAL REVIEW.

Société Royale et Centrale d'Agriculture.

The proceedings of the principal agricultural society of France, judging from the summary reports of the sittings now before us, and the memoirs selected for publication, appear to be of less interest and value, than might be expected from such a body. The course of procedure, however, is different from what has been the general, if not universal practice of agricultural societies in this country; and ours may learn something useful from the exhibition of that course, even though the subjects treated of should be unimportant. It is for this reason principally that the following translations of extracts are presented; though they are not altogether devoid of interest in other respects. Several subjects which were under consideration at some of the sittings of the society, and which deserve a distinct notice, will be presented hereafter in a separate form. Among these, there is a minute report of the remarkable and rapid variations in the height of water in an Artesian Well at Rochelle—and a discussion of some length on the effects of artificial meadows, and grass culture on the product and quality of succeeding grain crops. These, with various other matters we shall pass by, and present only short extracts on various subjects, which will best serve to show the general course of procedure.

The sittings of this society are frequent, and the reports and resolutions (as with us) usually to lasting effect. The society is very numerous, and has many branches. The reports are very full, and contain much interesting information. The resolutions are very important, and have a great influence on the agriculture of France. The society is very active, and has done much for the improvement of agriculture in France. The reports are very full, and contain much interesting information. The resolutions are very important, and have a great influence on the agriculture of France. The society is very active, and has done much for the improvement of agriculture in France.

more profitable. This is particularly worth the consideration of the members of our newly formed agricultural societies—which if constituted and operating as has been the case heretofore, will find their greatest difficulty to be, that when they meet, there is nothing presented for them to hear, or to discuss. We are a *talking* rather than a *writing* people. On the French plan of procedure, there would be no lack of assistants, nor of facts and opinions which they would present in conversation: and these conversations would lead to written memoirs from individual members, and reports of committees on the various subjects introduced, which would furnish plenty of business of a more deliberate and solid kind. We proceed to the extracts, taken from the *Annales d'Agriculture Française*.

Summary of the sitting of December 4, 1833.

"The President of the Agricultural Society of Lyons presents a copy of the work of *Butret* upon the pruning of fruit trees, of the edition published by the society of Lyons. He announces that he has made some experiments upon the method of planting twigs, or cuttings, of fruit trees, inserted in the roots of potatoes. His trials have all been fruitless: the cuttings have perished. In some cases the potatoes have rotted, in others they have sprouted. A member of the society observes, that the roots of the potatoes were only dug into to receive the ends of the cuttings, and that perhaps they ought to have been pierced through from one side to the other, in order that the radicles which would be developed around the cutting, might be able immediately to find soil; which is perhaps the reason of the failures—the result being opposed to those of other experiments."

"M. Huzard made a verbal report upon a little printed work of Sir John Sinclair's, upon the Roman Malaria. He concludes that the translation of this work may be useful, on account of the general views which it contains upon the bringing into cultivation marshy and unhealthy lands. The society sends the work to the editors of the *Annales d'Agriculture*."

The work of Sir John Sinclair's referred to, is that which was published in the first volume of the *Farmers' Register*.

December 18th, 1833.—"M. Chabrol de Volvie states that he was present at the trial of the *mechanical turnbril*, (machine for removing earth,) of M. Paulin Palissard (the son.) The machine appeared to him to fulfil the intention of the inventor; but that it is rather too complicated. The common *ravale* without wheels, which is employed by our cultivators to level their land, to dig ditches for conveying water, and which he had seen used in Egypt, appeared to him more suitable to the wants of agriculture. Perhaps the instrument of M. Palissard will be preferable and economical in the great public works of bridges and roads."

The *ravale* referred to seems to be similar to the *mouldebaert* of Flanders, or the scraper of this country, which is made much use of in the Northern States, but is scarcely known, and seldom used, in the South. In a subsequent number of the *Annales* a plate and description of M. Palissard's turnbril are given. It is a scraper with wheels.

The next extracts are specimens of the manner in which the elections of corresponding members are announced. The claims to the honor are seldom so strong as these—but in every case, there is attached to

the name, some circumstances relating to the condition of the member elect, which may be supposed to furnish the ground for his being chosen.

January 8th, 1834.—"The society proceeded to examine the titles of candidates proposed in the sittings of preceding years to be named as correspondents of the society, conformably to the ordinance of the King, which has authorised the society to increase the number to three hundred.

Correspondents appointed—

For the Department of the North. M. Alexandre Coget, member of the Chamber of Deputies, cultivator of his own land in the *arrondissement* of Lille, and who belongs to a family which, for three generations, has been distinguished for having fine orchards and plantations.

M. Debuyser, proprietor, director for the last twenty-five years of the French *moeres*, vast marshes which he has taken from the dominion of the waters, to convert them to fields and fertile meadows.

For Mayenne. M. Léon Leclerc, proprietor and extensive planter, [of trees] who possesses the most complete collection of fruit trees which exists in France."

January 22nd, 1834.—"Memoirs and notices addressed to the society—from M. Bacon, on the duration of leaves in Normandy—from M. Piérard upon plantations (of trees) on bad and shallow soils—and from M. Marcellin Vétillard, relative to grafts upon roots. All received to be read.

M. Payen announces that M. Champerois has discovered the means of condensing, by a very simple apparatus, the gases which escape from the carbonization of bones; that this condensation is made in very mellow earth, which, without the least doubt, must become by this operation a very good manure."

February 5th, 1834.—"M. de Galbois, in a letter, announces that the black pyritous ashes prepared in this department, are more and more in demand for manure, in that of the North—and that the consumption of the last year has exceeded 200,000 hectolitres. This substance, taken on the ground, may be delivered at the rate of 50 centimes the hectolitre, weighing about 200 lbs. Afterwards, M. de Galbois gives an account of the labor expended on the Artesian Well of Montreuil-sous-Laon, which has already descended 816 feet below the soil, of which 770 are in a bed of chalk, without yet reaching water to burst up: nevertheless the boring is continued."

The manure here referred to must be of a kind similar to the *cendres de mer*, or Dutch ashes, the value and effects of which have been described at large in several preceding numbers of the *Farmers' Register*.

February 19th, 1834.—"M. le Comte de Montlosier addresses to the society a memoir relative to the scarcity of manure [barn-yard] in France, and the means for remedy of the evil. Ordered to be printed.

M. Soulange Bodin communicates new documents upon the extension of the cultivation of the *Morus Multicaulis* [or Chinese mulberry.] It appears from a notice printed at Boston, and of which M. Soulange placed a copy on the table, that this tree is actually employed for the feeding of silkworms, both in the neighborhood of that city and of New York, where it has resisted the most rigorous cold of the winters. Near Venice there have been made experiments and observations preserved in a memoir addressed by M. Maupoil, who cultivates it largely on the Brenta. There have been obtained from sowing the seed, by this cultivator, a great number of varieties, which appear generally to approach to the white mulberry; which tends to prove that the first [the Chinese] is not a distinct species, but, as a valuable variety, cannot be preserved except by multiplying it by cuttings, grafts, or layers. It appears indeed that it is exclusively by

cuttings that the Chinese cultivators have propagated this tree, from time immemorial."

February 26th, 1834.—"A note was read from M. de Fayolle, in which this correspondent announces to the society, that a priest of the Department, M. Paramelle, seems to have discovered the passages that subterraneous waters follow in their course. The author of this discovery has already made numerous applications of it, in that Department and in that of *la Dordogne*, and at M. de Fayolle's also, in seeking for, and pointing out, springs which have almost always burst forth from the depths which he had previously indicated. After some observations made by M. Héricart de Thury, the society suspends its judgement on the extraordinary facts reported in this note, until M. Paramelle has published the work which he announces on this subject, and in which he will explain his hydrognostic theory. In the mean while thanks will be returned, in the name of the society, to M. de Fayolle for his communication."

March 7th, 1834.—"A letter was read from M. Villeret on the agricultural operations at Algiers, in which he announces the success of many articles of culture, among others of cotton and of the coffee plant, sugar-cane, &c. &c., and the probability of the success of many others. M. Mirbel announces that M. Amanton cultivates cotton with the greatest success in the Government garden at Algiers, and that there is no doubt of the possibility of a profitable culture of this plant. He announces that the coffee plant grows well also, with all the cares which are lavished on this shrub; but that much doubt exists relative to the profits of its cultivation. As to the sugar-cane, it grows well; but will it yield as much sugar at Algiers as in the countries where it is now profitably cultivated, and will not the very high price of labor at Algiers increase the chances of no returns from this culture? Every thing, at present, seems to indicate that the efforts of agriculturists ought not to be directed to the cultivation of the sugar-cane."

M. Chevreul reminds, that Proust has said, from experiments made by this chemist, that sugar-canes harvested in Spain, do not yield enough sugar capable of crystallization to make it profitable to extract and crystallize this sugar.

M. de Lasteyrie thinks, from data of his own, that the climate of Algiers is sufficiently warm to ripen the cane as well as in the Antilles and in India, and to make it produce the same quantity of sugar and of as good quality.

M. Mirbel replies that the coast of Algiers is not warmer than the southern coasts of Spain, and that he sees no probability that the cane can there acquire superior qualities. And if it could even acquire superior qualities, it is not probable that it can acquire the qualities of the canes of the Antilles and of India; besides, the high price of labor would form a second obstacle to the economy of its cultivation and manufacture: he does not therefore think it prudent yet to indicate the sugar-cane as likely to yield profitable products at Algiers.

M. Girard says, that he has seen sugar-cane cultivated in Egypt, that it yields, it is true, a sugar capable of crystallization, and this sugar is extracted without being refined. But he believes the climate of Egypt more favorable to this culture than that of Algiers, and yet the cane cannot be cultivated there with near the same profit as in the Antilles.

M. Michaux, without deciding on the question, says that he has seen cultivated in the southern provinces of the United States two very distinct varieties of the sugar-cane: one which ripened in five months, while the other required eight before being fit to cut. The first was cultivated with some profit in provinces where it freezes in the winter. Perhaps we might try this species in our African possession.

M. Warden communicates a letter of a Mr. Treeman of South Carolina in the United States, in which

he mentions a new variety of herbaceous cotton, of long staple, obtained by him, and very superior to that now cultivated. He has sent with his letter some samples of the cotton still in the seed. M. Warden submits the samples to the inspection of the society."

We are at a loss to know what kind of cotton is here spoken of, and who the person is from whom it was derived. But as foreign names of persons are rarely placed in a French work without being changed in the spelling, it may be doubted whether Mr. Treeman's name as here given, without the circumstances which accompany it, would be recognized by its owner. But besides this, there are several other parts of these extracts which show that facts, which in this country are so well known that no one would think them worth being made subjects of distinct communication, are both new and valuable in France—and in like manner, the farmers of this country may receive profitable instruction from the incidental remarks of foreign writers, on subjects which they would have deemed every where of trivial, if indeed of any value. It is very true that the great mass of agricultural practice in either country is unsuited to the other. But still there are many exceptions to this general state of things—and in these alone, either country may greatly profit from details of the agriculture of the other. An open and free exchange of information is greatly wanting, and it is hoped that this desirable state of things is not far distant. We are approaching to the possession of free trade—and of all commodities which it is desirable should be exchanged freely, *knowledge* is the most important, and the most profitable to both parties.

Translated for the Farmers' Register, from the *Bulletin de la Société d'Encouragement pour l'Industrie Nationale*—1834.

DIRECTIONS FOR THE MAKING AND GENERAL MANAGEMENT OF SPARKLING CHAMPAGNE WINE.

A report made by M. Herpin, from the Committee on the Economical Arts, upon a memoir presented by M. Boyer, on the making of the sparkling white wines of Ai.

Gentlemen:—It was formerly believed that sparkling was a quality peculiar to the wines of Champagne; the discoveries of pneumatic chemistry have taught us that this sparkling which is in such high request, is produced by the escape of carbonic acid gas condensed in the liquor, and that to obtain sparkling wine, it is sufficient to bottle it before the imperceptible fermentation is complete.

In fact, in many of our departments, and particularly in Burgundy, the preparation of sparkling wines has been attempted with success: yet Champagne supports the competition with that superiority which is given by a suitable soil and proper vine-stocks, and cultivation by skilful and practised laborers, and finally by a certain method improved and established by long experience.

M. Boyer, long a comptroller of the indirect taxes, has taken advantage of his situation and of his residence in Champagne, at Ai itself, to study the process followed there in the production of sparkling wines. His memoir upon this subject gives interesting details which it seems useful to us to publish.

The sparkling white wine of Champagne is made of black or white grapes of the first quality; they are gathered with care, and carried immediately, cautiously, and without being shaken to the press: they are immediately crushed to prevent the juice from fermenting and becoming colored. The liquor produced by the first pressing is kept separate—this is the best quality.

The wine is afterwards put into casks in which the fermentation is effected; about the middle of December it is fined and racked; it is fined and racked a second time about the month of March; afterwards it is bottled and the corks are tied.

Some months after they proceed to the clearing, (*dégorgement*) an important and delicate operation, the object of which is to remove the deposit which is formed in the bottles, and which injures the transparency of the liquor.

The clearing is performed in several different manners, of which each merchant makes a secret; this operation consists, generally, in bringing by degrees towards the neck of the bottle the deposit which is formed in the wine. When this deposit is collected near the cork, that is suddenly drawn, and the sediment permitted to escape, after which the bottle is filled up again and corked anew; some months after a second clearing is made, and sugar-candy and brandy are added to the wine.

It is not till after fifteen or eighteen months after bottling, that the sparkling white wine is supposed to have received the perfection requisite for its exposure to sale.

Such in a few words, gentlemen, is the general process for the preparation of the sparkling wines of Champagne. M. Boyer enters into lengthened details on the greater number of these operations, and describes a new method of clearing, to which many merchants give the preference.

I have the honor to propose to you in the name of the Committee of the Economical Arts,

1st. That M. Boyer receive the thanks of the society for his communication.

2nd. To insert in the Bulletin an extract from the memoir of M. Boyer.

Approved in the sitting of 6th March, 1833.

Signed,

HIERPIN, Reporter.

MEMOIR ON THE MAKING OF THE SPARKLING WHITE WINES OF AI.

To make the sparkling white wines of AI, the ripest and soundest black grapes are gathered, (the white being destined only for ordinary wine,) rejecting such as are dry, rotten, or bruised, they are put into large panniers which are carried on the backs of horses, taking care to cover them to protect them from the heat of the sun: in the courts or gardens near the press, these panniers are set in the shade.

If the sun heats the atmosphere too much, and dries the grapes so as to occasion the commencement of a fermentation, the panniers are slightly watered; the object of the watering in this case is to hinder the wine from turning yellow in the making.

Operations.

To make the sparkling white wine of AI, the grapes are not detached from the clusters.

The vintage vat is first washed and well cleans-

ed, and then the nuts and screws of the press are carefully examined and well greased.*

After these preliminary operations, the panniers of grapes are brought to the press. The fruit is poured into the vat on the evening, or sometimes in the following morning after it is gathered. The press is filled according to its strength and dimensions, that is to say, with from about twenty to forty panniers; this operation is called forming and filling a *marc* of grapes to make a *sac*. Forty panniers of grapes yield from nine to ten *pièces* (or casks) of white wine, each cask containing two hundred bottles.

When the filling is finished, three successive pressings are given; each of these pressings lasts from twenty-five to thirty minutes, together an hour and a half at most; a longer time would color the wine. The juice which flows spontaneously from the grapes is called *mère goutte*.

For the second operation the press is loosened, the surface of the liquor (or *must*) is skimmed, and all impurities removed, even the stems of the clusters which have been pressed, and which cover its surface: this skimming is repeated after every pressing.

The edges of the *marc* which, by the pressure, is enlarged and misshapen, are trimmed; the trimmings are cast upon the mass; and then they proceed to a second and a third pressing.

The wine produced by the first pressing is called *vin de pressoir en pur noir*. As there is *must* still remaining in these *marcs* they are trimmed again and receive another pressing, which is called *première taille*; the wine produced from it often enters into that of the best quality (*de choix*); it is allowed to drain. The second pressing is called *seconde taille* or *vin de tisane*. If a third pressing is given, its product is a poor and harsh wine.

At each pressing the grape juice flows into a small vessel, called the *barlon*, placed for this purpose under the press. The first pressings being given, the *must* which proceeds from them is called *vin d'élite*, *vin de choix*, and improperly *de cuvée*; this *vin d'élite* which has flowed into the *barlon* is carried into a tub where it remains all night to deposit its first lees, considered as the first fermentation which does not take place till after the pressing. It is now that the wine becomes white.

This first fermentation is indicated by the presence of a mucous or floating scum, called *cotte*, which is formed on the surface of the *must*; the wine which becomes clear allows the bottom of the tub to be seen. After the pressing, (qu. fermentation?) the wine is carried to be put into puncheons, which have been fumigated with sulphur after being well rinsed. At this moment, and if there is occasion, the makers pour into the cask a bottle of Cognac brandy, in order to give the wine more body and to prevent too great a fermentation; by these means the maker obtains, besides, the advantage of preserving the lusciousness of the wine. The first pressing is set apart.

The two next pressings give the *vin de pressoir*. Afterwards comes the *vin de rébêchage*, so called, because the pressmen spade and break up, and prepare for more complete draining (*emelisent*)

* The substance employed is a composition of oil and *mine de plomb*, (a mineral resembling talc and of which crayons are made) or soap alone is used.—Ta.

the *marc* of grapes, which is pressed again two or three times, as well as the rest: for it is important that the *marc* be entirely dried.

The wines of the first, second, and third pressings, are carried successively and put into the puncheons in the order of their extraction from the press, as has been intimated above.

Finally, in certain cantons, only three successive and rapid pressings are given; in others but two; in all cases, however, it is necessary that the three operations should be performed within the space of an hour and a half at the most.

The white wine which has been put into the puncheons enters into a fermentation, violent at first, and subsiding into an imperceptible fermentation. By pressing the *marc* more or less briskly (*vivement*) the fermentation is increased or diminished. About the end of December, by which time the wine has undergone a proper elaboration, it becomes clear, and in fine dry frosty weather it is racked. It is always contrived to keep the wine in an equal temperature before bottling it, by which care it is obtained equally purified.

Fining.

To fine the white sparkling wines and the rose colored, (which will be spoken of hereafter) isinglass from Russia or Marseilles is used, this is melted with a little cream of tartar, (supertartrate of potash) or sometimes with alum, when the red wines appear difficult to clear. The mixture is put to steep in water and squeezed with the fingers or palms of the hands; the water becomes white: the eighth of an ounce (*gross*) of isinglass is sufficient for a cask.

The wine is racked a second time in March, and sometimes fined again if it seems to require it, but*the quantity of isinglass is less than that employed in the first fining. This second racking is usually made fifteen days before the wine is bottled.

To increase the richness of the wine a cordial (*caramel vineux*) is made, composed of sugar-candy and white wine clarified.

Rose colored wine.

When it is desired to make rose colored wine, the grapes are squeezed and gently stripped from the clusters, they are shaken and left in a state of fermentation; afterwards they are carried to the press and receive the same pressings as for the sparkling white wines. This wine is set to work with raisins which color it.

The bottling and formation of the piles.

The wine is not bottled till towards the end of March; this operation being finished, the corks are tied with common twine and iron wire, and then the piles of bottles are formed. For this purpose, laths are placed upon the ground horizontally and in two parallel lines, at such a distance that the two ends of the bottles may rest fixed and solid; two rows of bottles are placed in opposite directions; then other laths are fixed on these two first rows, and on these last laths other bottles, and so in succession to the desired height of the pile. This height is perpendicular, and pretty generally from three to four feet, that is to say, the piles are raised to the height of from ten to fourteen diameters of the bottoms of the bottles. There are piles of which the length does not ap-

pear to be fixed; their thickness also seems to be arbitrary, yet they are calculated at two bottles abreast, after which an interval of about a finger is left between the piles for the circulation of air.

Of the breakage.

The breakage which the makers suffer commences in March, and continues in May, and sometimes till the wine is ready for sale. This breakage, which has not yet been sufficiently studied, has appeared hitherto to be a simple effect of fermentation; it is not felt by the maker unless it exceeds twenty per cent.*

New method of purifying the wine or for the clearing (dégorgement) from the sediment.

After the bottling, preparations are made for clearing off the sediment formed in the bottles. For this, the bottles are placed upon racks, or planks pierced with lengthened oval holes, with a neck; the bottles are inclined towards their mouths, this inclination is supposed to be of about thirty degrees.

When it is designed to collect the sediment which the wine contains, the bottle is shaken, without being moved out of its place, by turning it as gently as possible, one-third of its largest diameter.† These three circular motions given with equal dexterity and skill, force the sediment to collect together, and the inclination of the bottle causes it to be fixed upon the cork.‡

When it is well ascertained that the sediment is collected upon the cork, the bottles are taken one after the other to examine the clearness of the wine, which is then said to be without any trace of light *volland*. This word, purely professional, signifies stain or shade of a sediment of a dark color.

If the wine is in a proper state, they proceed to the clearing.

The clearing (Dégorgement.)

The person who performs this operation takes the bottle which is to be cleared, lays it along upon his left arm, and after having inverted it, holds it in a perpendicular position. Provided with a small instrument which he holds in his right hand, he breaks suddenly the twine and wire which confine the cork; this forcible breaking by shaking the cork, permits the gas to expand and force the cork out of the bottle. At this moment the sediment is disengaged, and falls all together into a vessel placed to receive it. The operator supposing the sediment completely discharged, restores the bottle to its upright position by a quick and dexterous turn of the hand, and examines if

* M. Herpin has observed that the breakage may be much diminished by filling the bottles only two-thirds or three-quarters full during the whole time necessary for the clearing of the liquor.

† Not more than thirteen years ago, they took the bottle in the hand and shook it; this shake, always too violent, did not allow the wine to free itself entirely of its sediment; and hence it was never obtained perfectly clear. We are indebted for the new process to four Germans, who taught it to *Madame Cligot* of Reims, who for many years has derived great advantage from it.

‡ The original is not clear in this, for there is no previous mention of the three circular motions.—T.A.

the wine is perfectly clear; in which case, he hands it to the workman whose business it is to fill up the bottles after the removal of the sediment. This filling up is made either with the wine of commerce (*commerçable*) or with brandy. If brandy is used, the proportion is one, one and a half, two, and four per cent. The bottles are corked again with new corks well selected, which are compressed by an iron machine, made to open and close by the action of the right foot; the workman turns the cork in the machine with his right hand. If, on the contrary, corks which have already been used, are employed, they are slightly steeped in brandy. The corks are tied again in the same way as at first.

If there is occasion, the bottles are put in piles again for a new clearing, and if after this, the wine is not perfectly clear and transparent, it is put aside to be carried through a new course of operations. The wine is not brought into market till fifteen or eighteen months after it is bottled.

Mixture or composition of the white wine of Aï.

It is the nature of the wine of Aï, unmixed, to be sparkling when it is not too luscious; but if pure it would be too dear. To obtain that sparkling which is so agreeable at the table, it has been necessary to seek long, and to try many combinations before arriving at that now employed.

The wines of Aï, of Pierry, of Verzenay, of Craman and of Aize united, form what the makers call a *cuvée*; these wines enter into the composition in the following proportions. The wine of Aï is six-twelfths; the other six-twelfths have not a well ascertained proportion among the other wines. This results from the apparent nature of the primitive wine, that of Aï.

Particular qualities of these wines.

The wine of Aï is very strong and very luscious.

The wine of Verzenay is heady and dry, it has the property of preventing the liquor from turning oily.

That of Craman, very luscious, would by itself occasion oiliness, it is employed only for its peculiar quality, a taste of muscat wine; it also occasions sparkling.

The others, which are the product of the white grape, an acid grape, have the property of preventing the wine of Aï from becoming oily, and of contributing to its sparkling quality.

From the Portsmouth Journal.

LUNAR INFLUENCE.

If the tides of the ocean are raised from their fathomless bed by the power of the silver moon, it is not too much to believe that the tides of the atmosphere are subject, in a great degree, to the same mysterious influence.

In tropical climates especially, the power of the moon over animal and vegetable life, is believed by many to be very great, and why not in other portions of the globe also? It is stated by a learned writer that in Demarara there are thirteen springs and thirteen autumns every year; for so many times does the sap of the tree ascend to its topmost branches and descend to the roots. For example, the *wallaba*, a resinous tree common in

Demarara, and somewhat resembling the mahogany, if cut down in the dark, a short time before the new moon, is one of the most durable woods in the world for building purposes; in that state attempt to split it, and with the utmost difficulty it will be driven in the most jagged, unequal manner; cut down another tree of the same kind, at full moon, and the tree, it is said, can readily be split into the finest smooth shingles, or into staves for making casks; but in this state if applied to building purposes, it speedily decays. Bamboos as thick as a man's arm, if cut at the dark moon, will endure ten or twelve years; if at full moon, they will be rotten in two or three years; and thus it is with most of the forest trees. If these statements can be relied upon, they would seem to afford an important practical hint to those engaged in getting out and preparing shipping timber from extensive forests in our own country. Have any experiments ever been tried, or any facts noticed by ship builders upon the subject? It is true, we believe, that the timbers of our public vessels oftentimes rot while yet on the stocks and before they are completed. May not the circumstance be attributed to the particular season and particular age of the moon when the timbers were felled in the forest.

From the Cultivator.

RIBBON GRASS.

The ribbon grass of our gardens, *Phalaris Americana*, is likely to become of great value in our husbandry; it has been found to be better adapted to wet boggy grounds than any other species of grass; to propagate rapidly, either by its seeds or by its roots; to yield a very large product in hay or pasture, and to be well adapted to farm stock. The first suggestion of this fact came to us in a letter from Abedn. Robinson, of Portsmouth, N. H., who says the discovery was accidental.

"A neighbor," he says, "wishing to get rid of some of the roots which encumbered his garden, threw them into a bog, where they took root, and spread over a large space of ground, excluding every other plant. The water flows through the roots at all seasons. The turf has become so solid as to bear a cart and oxen. I walked through this grass when in bloom, and never beheld a more handsome and luxuriant growth. It stood perfectly erect, full of large leaves, even, and from four to five feet high. It will produce two good crops in a season, and springs up immediately after the scythe. It produces excellent food; cattle feed it close, and appear to be more fond of it when made into hay than any other grass. I have spoken for one-half of the roots of the patch, and have ground ploughed in my meadow in which I intend to transplant them, at about the distance of corn hills."

On a recent visit from the Hon. E. Goodrich, of Hartford, we were happy to receive, from that gentleman, a confirmation of the good opinion of the *Phalaris* which had been induced by Mr. Robinson's letter. It has been found as beneficial in Connecticut as in New Hampshire. Not recollecting the particulars narrated, we would beg of Mr. Goodrich, when he sees this, to forward them to us, in order that we may publish them correctly. The subject merits further attention; and if our

anticipations are not irrationally founded, the *Phalaris Americana* will yet become the gama grass of the north. It is truly perennial, spreads rapidly, and may be innoculated in the manner suggested by Mr. Robinson, especially in a soil saturated with water, with great facility, and at trifling expense.

From the Entomological Magazine.

ON THE APHIS, &c.

The true blight or Aphis is a quite, dull stupid-looking insect, mostly without wings, but sometimes it has four, two of which are much larger and longer than the other two, and fold over and hide them, reaching beyond the body, and meet together behind it. These wings are generally as clear as crystal, with a few veins in them, yet if you hold the insect in the sunshine, and examine him through a glass, you will find they take all the colors of the rainbow: you will also find he has a long trunk or sucker, which is used as a pump or syphon, through which the sap of plants is drawn. I have sometimes seen this sucker so long as to pass under the breast and legs, and reach a considerable distance behind the body, but it is not generally so. All blights infest the young and juicy shoots and leaves of plants, for the purpose of sap-sucking: and the plants honored by their operations forthwith play the most amusing and incredible vagaries: bearing blossoms instead of leaves, leaves instead of blossoms: twisting into corkscrew stems which ought to be straight, and making straight as sticks those which, like the scarlet runner and hop, ought to twine; as in the peach, making the leaves hump up in the middle, and causing the tree to look as though it had a famous crop of young fruit; making apple trees bear blossoms on their roots, and causing roots to grow out of their young shoots; and, by tormenting orchards in this way, preventing the fruit from ripening, and making it woolly, tasteless, and without juice. Our China asters often owe a good deal of their beauty to these vermin; they act as a spur to make them blossom beyond their strength and nature, and then die off without bearing seed. It is amusing to see with what regularity the blight station themselves on the young shoots of the Guelder-rose, crowding so close together that not a morsel of the rind is to be seen, and not unfrequently forming a double tier, or two thicknesses; the poor sprig losing its former unbending upright position, and writhing itself into strange contortions.

Blights are of all colors, but green is their most fashionable hue; those of broad beans are black as soot, and velvety; and these, if attended to, do but little harm; they cluster at the very top, and each bean should be lopped just below the blight, and the top carried away and burnt, not thrown on the ground, or else they are sure to climb up the bean stalks again, and, stopping here and there at the best landing place, to increase and multiply, thus soon covering the whole plant; nor should they be buried in the ground, for they take care to outwit you by living under ground for months, and, when the gardener's spade turns them up again, they make for the beans directly; the plan of lopping the beans does not injure the crop, cut, if carefully done, rather improves it. The blight of the willow is very large, and, at first

sight looks grayish, but under a glass is beautifully variegated with black and white; when crushed it gives out a deep blood-colored die, which stays on your hands several days, in spite of frequent washings.

I have taken a good deal of pains to find out the birth and parentage of true blights; and for this purpose have watched, day after day, the colonies of them in my own garden, and single ones which I have kept in-doors, and under tumblers turned upside down. The increase is prodigious; it beats every thing of the kind that I have ever seen, heard, or read of. Insects in general come from an egg; then turn to a caterpillar, which does nothing but eat; then to a chrysalis, which does nothing but sleep; then to a perfect beetle or fly, which does nothing but increase its kind. But blights proceed altogether on another system; the young ones are born exactly like the old ones, but less; they stick their beaks through the rind, and begin drawing sap when only a day old, and go on quietly sucking away for seven or eight days; and then, without love, courtship, or matrimony, each individual begins bringing forth young ones, and continues to do so for months, at the rate of from a dozen to eighteen every day, and yet continues to increase in size all the while: there seem to be no males, no drones, all bring forth alike. Early in the year these blights are scattered along the stems, but as soon as the little ones come to light, and commence sap-sucking close to their mother, the species get filled up, the old ones look like giants among the rest, as here and there an ox in a flock of sheep; when all the spare room is filled up, and the stalk completely covered. The young ones, when they make their first appearance in the world, seem rather posed as to what to be at, and stand quietly on the backs of the others for an hour or so; then, as if having made up their minds, they toddle upwards, walking on the backs of the whole flock till they arrive at the upper end, and then settle themselves quickly down, as close as possible to the outermost of their friends, and then commence sap-sucking like the rest; the flock by this means extends in length every day, and at last the growing shoot is overtaken by their multitude, and completely covered to the very tip. Towards autumn, however, the blights undergo a change in their nature; their feet stick close to the rind, their skin opens along the back, and a winged blight comes out—the summer generations are entirely wingless. These are male and female, and fly about and enjoy themselves; and, what seems scarcely credible, these winged females lay eggs, having first lived through the winter; and, whilst this operation is going on, a solitary winged blight may be observed on the under sides of the leaves, or on the young shoots, particularly on the hop, and differing from all its own progeny, in being winged and nearly black, whereas its young are green and without wings. In May, a fly lays a lot of eggs; these eggs hatch and become blights; these blights are viviparous, and that without the usual union of sexes, and so are their children and grandchildren, the number of births depending solely on the quantity and quality of their food; at last, as winter approaches, the whole generation, or series of generations, assume wings, which the parents did not possess, undergoes frequently a total change in color, and in the spring, instead of being viviparous, lays eggs.

You will never find a plant of any kind infested with the aphid, without also observing a number of ants and ladybirds among them, and also a queer-looking insect, like a fat lizard, which is in fact the caterpillar of the ladybird. The connexion of the ant and the aphid is of the most peaceful kind that can be conceived; their object is the honeydew which the aphid emits; and, far from hurting the animal which affords them this pleasant food, they show it the greatest possible attention and kindness, licking it all over with their tongues, and fondling it, and patting it, and caressing it with their antennæ in the kindest, prettiest way imaginable. Not so the ladybird, or its lizard-like caterpillar: these feed on the blights most voraciously, a single grub clearing a leaf, on which were forty or more, in the course of a day. The perfect ladybird is a decided enemy to them, but not so formidable a one as the grub. The eggs of the ladybird may often be seen on the hop leaf; they are yellow, and five or six in a cluster placed on their ends; these should on no account be destroyed, as is too often the case; but, on the contrary, every encouragement should be given to so decided a friend to the hop-grower.

Besides the ladybird and its grub, there are two other terrible enemies to the poor aphid; one of which is a green ungainly-looking grub, without legs, which lies flat on the surface of the leaf, and stretches out its neck just like a leech, till it touches one of them; directly he feels one he seizes it in his teeth, and holds it up wriggling in the air, till he has sucked all the goodness out of it, and left it a mere empty skin. This curious creature turns to a fly [one of the *Sylphidæ*, *Ed. Ent. Mag.*], which has a body banded with different colors, and which in summer you may often observe under trees and about flowers, standing quite still in the air, as though asleep, yet, if you try to catch him, darting off like an arrow. The other has six legs, and very large strong curved jaws, and is a most ferocious-looking fellow, strutting about with the wings of the blights which he has killed on his back. This fierce fellow comes to a very beautiful fly [*Chrysopa Péria*, *Ed. Ent. Mag.*] with four wings, all divided into meshes like a net, and two beautiful golden eyes. All these creatures, which thus live on the plant lice, have a very strong and disagreeable smell in the perfect state.

For a favorite plant infested with blight there are several remedies—smoke of tobacco, snuff, &c.; but the most effectual, and the least hurtful to the plant, is to let it stand in the tank of cold water for half an hour, when all the blights will leave it, and swim on the surface of the water.

From the United States Gazette.

FLOUR OF SLIPPERY ELM.

Being in the country a few days since to visit a sick friend, I was shown an article entirely new to me, which is said to be remarkably nutritious and palatable, for debilitated and sick persons. It was flour prepared by the shakers, from slippery elm, and used, the same as arrow root. One table spoonful of this flour boiled in a point of new milk, is excellent to feed infants weaned from the breast; they will not only fatten upon it, but it will prevent bowel complaints. It makes an easy and

nutritious diet for consumptive and dyspeptic persons. From the character I received of it, I presume that it only need be known to become of general use. It is sold by Isaac Thompson, druggist, corner of Market and Second streets.

From the New England Farmer.

ON THE CULTURE OF HOPS.

In compliance with repeated requests, we propose to devote a column or two to remarks on the culture of hops, preparing them for market, &c.

An excellent article on this subject, written by Wm. Blanchard, Jr. Esq. was first published in the New England Farmer, vol. 11, p. 52; and has been since republished in *Fessenden's Complete Farmer*, p. 149. Mr. Blanchard observes, that the soil best calculated for the production of hops is a sandy loam, rather low and moist; but states that he has seen very fine crops raised on very different soils. Plough the land 9 or 10 inches deep in October—harrow thoroughly in the spring in the same direction the land was ploughed—manure at the rate of about 16 cords to the acre, or more if the land be much reduced. Cross plough the land to nearly the same depth—furrow as for planting corn, the furrows at least four feet apart—plant corn or potatoes, (potatoes preferable,) the first year with the hops. Plant every other hill in every other row with hops, thus placing the hills of hops at least eight feet apart—put four cuttings from the running roots about eight inches in length, into each hill, and cover them the common depth of potatoes—keep the hops clear from weeds, by hoeing. In October cover each hill with a shovelfull of compost manure, that from the hog-stye preferred—in each following spring, before the hops are opened as it is termed, spread evenly over the yard about eight cords of manure to the acre, (that which is coarse and strawy is preferred,) plough the land both ways at the first hoeing—but three hoeings in a season, unless necessary to subdue weeds. The last time of hoeing about the beginning of August, or when hops are in full blossom.

"After the first crop it is necessary to open the hops every spring by the middle of May; which is performed by making four furrows between the rows, turning the furrows from the hills, and running the plough as near the same as possible without injuring the main roots. Then the earth is removed from the roots with a hoe—all the running roots cut in with a sharp knife, within two inches of the main roots—the tops of the main roots must also be cut in, and then the hills covered with earth about two inches deep."

The poles should be set as soon as the hop vines appear, which will save labor in tying up the vines. Mr. B. allows but two vines to a pole, and two poles to a hill—poles not to exceed sixteen feet in height. The most thrifty vines must be selected and trained to the poles by fastening them by a piece of yarn slightly twisted together by the thumb and finger. Frequent attention is necessary to tie up the vines, as they are subject to be blown off by high winds. The hops are ripe about the beginning of September, and should be immediately gathered, or the crop is lost. The quality of the hops depends much on their being picked clean from leaves and stems. The picking may be done by women and children, having one

man to a bin to handle the poles and to inspect the pickers. The bin is a wooden box, about nine feet long, three feet wide, and two and a half feet high, made of thin pine boards, that it may be easily moved over the yard, across which the poles are laid, and into which the hops are picked by hand. Care should be taken when gathering the hops, to cut the vines two feet from the ground, that the roots may not be injured by bleeding.

The most important part in the management of hops, is the curing and drying of them. Hops always grow first sort; second sort, and refuse hops are made so by unfortunate or unskilful management.

Much depends on a well constructed kiln. The side of a hill is its best situation for convenience of putting the hops on the kiln. It should be in a dry place. The kiln should be dug out the same bigness at the bottom as the top; the side walls laid up perpendicularly, and filled up solid with stone to give it a tunnel form. Twelve feet square at the top, two feet square at the bottom, and at least eight feet deep is deemed a convenient size. On the top of the walls sills are laid having joists let into them in like manner as for laying a floor—on these joists, laths about one and a half inches wide are nailed, leaving open spaces between them three-fourths of an inch, over which a thin linen cloth is spread, and nailed at the edges to the sills. A board about twelve inches wide, is set up on each side of the kiln, on the inner edge of the sill, to form a bin to receive the hops. The larger the stones made use of in the construction of the kiln the better; as it will give a more steady and dense heat. The inside of the kiln should be well plastered with mortar to make it completely air tight. Charcoal (that made from yellow birch or maple I should prefer,) is the only fuel proper to be used in drying hops. The kiln should be well heated before any hops are put on, and carefully attended to keep up a steady and regular heat.

Fifty pounds of hops when dried, is the largest quantity that should be dried at one time, on a kiln of this size; and unless absolutely necessary to put on that quantity, a less would dry better. The green hops should be spread as evenly and as light as possible over the kiln. The fire at first should be moderate, but it may be increased as the hops dry and the steam is evaporated.

Hops should not remain long in the bin or bag after they are picked, as they will soon heat and become insipid. The hops should not be stirred on the kiln until they are completely dried. They should then be removed from the kiln into a dry room and laid in a heap, and there remain unmoved and unstirred, until bagged, which is done with a screw, having a box made of plank, the size the bag is wished, into which the cloth is laid, and the hops screwed into the box, which is so constructed that the sides may be removed, and the bag sewed together while in the press.

The hops after laying a few days will gather a partial moisture called a sweat. The sweat will probably begin to subside in about eight days, at which time and before the sweat is off, they ought to be bagged in clear dry weather. As the exact time when the hops will begin to sweat, and when the sweat will begin to subside or dry off (the proper time to bag them,) will vary with the state of the atmosphere, it will be necessary to examine

the hops from day to day, which is easily done by taking some of them from the centre of the heap with your hand. If on examination you find the hops to be very damp and their color altering which will be the case if they were not completely dried on the kiln, and not otherwise, you must over-hale them in the air.

The most convenient size for a bag of hops to handle and transport is about five feet in length, and to contain about 250 pounds. The best bagging is coarse strong tow cloth of our domestic manufacturing; next to that Russia hemp bagging. The East India sugar and gunny bags, so called, ought never to be used. The sugar bags, are of an unreasonable weight, and both they and the gunny bags are of no value to the brewer, whereas the other bags are worth prime cost.

It is now common for those who have entered considerably into the cultivation of hops, to build houses over their kilns, which in wet weather, are very convenient; otherwise a kiln in the open air would be preferable. It is necessary to have these buildings well ventilated with doors and windows; and to have them kept open night and day, except in wet weather, and then shut those only which are necessary to keep out rain. If a ventilator was put in the roof of the building, directly over the centre of the kiln, about six feet square, it would be very advantageous. I have seen many lots of hops much injured both in color and flavor, by being dried in close buildings.

Where the houses over the kilns are built large, for the purpose of storing the hops as they are dried, which is a great saving of labor, a close partition should be made between the kilns and the room in which the hops are stored, to prevent the damp steam from the kilns coming to them, as it will color them, and injure their flavor and quality very much.

Many of our farmers will object to the mode here recommended of manuring hops, their common practice being to put the manure in the hills, when they plant the hops, and afterwards to apply the manure on the hills at the first and second hoeings. Mr. B. thinks that the manure in the hills has a tendency to produce worms, and its fermentation at their roots to cause their decay; and that a hop yard manure in the manner he directs will continue in a fertile state for many years. He also supposes that the quantity of manure recommended will be objected to by many. Where hops have been cultivated many years, farmers complain that the quantity raised per acre does not exceed one-half as much as was raised by their ancestors on the same land. Hops I believe, in common with all sorts of grain and vegetables flourish best and produce the finest crops, when cultivated on new lands, which required little or more manure—and such were the lands their ancestors cultivated. The same complaints I presume would be made against all sorts of grain and vegetables if raised with little or no manure, on lands which have long been cultivated. No crop can be more improved and increased by high cultivation than hops.

VALUE OF HOPS.

The Bangor Republican says there are farmers not thirty miles from Bangor, who have taken a thousand dollars in cash, as the clear income from their crop of hops the present season.

For the Farmers' Register.

ON THE ROAD LAW OF VIRGINIA—NO. I.

The people of Virginia have one feature in their national character which has scarcely attracted observation or remark, but which undeniably exists, and exerts a powerful influence on their legal and general policy. This is our ready submission (if not attachment) to established and long existing legal regulations, and our opposition, no less strongly marked, to whatever is new, and untried by ourselves, however well known, and highly approved, by other communities. A certain degree of this steadiness is valuable—and I am willing to acknowledge that Virginia owes to the feeling which causes it, much of her high political character. We are altogether free from the sudden and complete political changes of views and policy which are often exhibited in some of our sister States—and we thereby give to them this lesson in government, (which they fully return to us in practical and economical matters,) that steadiness and perseverance in a course, even though it be not altogether the best, is more likely to succeed than great and frequent changes. But every thing may be carried to an injurious extreme: and to this extent I conceive we carry our approval of, or submission to old institutions, and our violence of objection to innovations. There are legal provisions on our statute book, (*sleeping there very harmlessly in most cases, I admit*) which have regularly been approved and retained at each deliberate revision of the code—and which could not be repealed without a continued struggle maintained for years together—but which, if just now proposed, could not possibly be enacted—and indeed, as to some of them, the very attempt to have them enacted, would put the whole commonwealth in a ferment. It is not my purpose to take a general, or extended view of this subject, nor to notice particularly, even the most remarkable examples in our laws—but to ask attention to *one example* which has practical ill effects bearing upon all, and daily felt, and which are endured for no other reason except that they have been long borne, and that our shoulders are now accustomed to the burden. I allude to the *road law as enacted*—and still more to the *road law as usually executed*.

Before proceeding with particular remarks, I will quote those sections of our law respecting public roads, which prescribe the duties of the surveyors, the means which they are empowered to use, and the manner in which these means are to be applied for the important object of preserving the roads in the best condition for the public use and benefit.

"4. The several courts shall also divide all the public roads into precincts, and, as often as it shall be necessary, appoint a surveyor over every precinct, whose duty it shall be, to superintend the road in his precinct, and see that the same be cleared, and kept in good repair; which surveyor shall continue in office, until another shall be appointed by the said court in his stead.

5. All male laboring persons, of the age of sixteen years or more, except such as are masters of two or more male laboring slaves of the age of sixteen years, or more, shall be appointed by the court to work on some public road. For every person so appointed, who, when required by the

surveyor placed over him, shall, without legal cause or disability, fail to attend, with proper tools for clearing the road, or shall refuse to work when there, or to find some other person equally able; to work in his room, the sum of one dollar and twenty-five cents for every day's offence, shall be paid, by himself, if he be a free man of full age; if an infant, then by his parent, guardian or master; and if a slave or servant, then by his overseer, if he be under one, or otherwise, by his master: 'and be recoverable by the surveyor, with costs, before a justice of the peace, and by the said surveyor to be expended, after deducting the amount of his costs in all such cases, in which he may warrant or give information, in the improvement and repair of the road, for failing to work on which the penalty was incurred.'

"7. Every surveyor of the road, shall cause the same to be constantly kept well cleared and smoothed, and thirty feet wide at the least; 'unless the court shall, by order entered of record, authorize a less width;' and, at the fork or crossing of every public road, shall cause to be erected, and kept in repair, from time to time, a stone, or, otherwise, an index on a post or tree, with plain inscriptions thereon, in large letters, directing to the most noted place, to which each of the said roads shall lead, and may take stone or wood for that purpose from any adjoining land; and, for the expense of setting up and inscribing such stones, posts or indexes, and keeping them in repair, the surveyor shall be reimbursed by the county court, in their next succeeding levy; and, where bridges and causeways are necessary, the surveyor shall cause them to be made twelve feet broad at the least, convenient and safe, and shall keep the same in repair, and for that purpose may cut and take from the lands of any person adjoining, such, and so much timber, earth, or stone, as may be necessary, the same being first viewed and valued by two honest house-keepers, appointed and sworn for that purpose, by a justice of the peace; unless the owner shall freely give such timber, stone or earth for that use; but, where a road leads through a city or town the surveyor shall not take any timber, stone or earth, from any lot within the town, without the permission of the owner, but shall take the same from the lands nigh or adjacent to the said town, where it will do the least injury to the proprietor; and where the assistance of wheel carriages is necessary, for making or repairing any causeways, any justice of the peace may issue his warrant, under his hand and seal, for empowering the surveyor to impress such necessary carriages, draught horses, or oxen, with their gear and driver, belonging to any person, who, or their servants or slaves, are appointed to work on the road, and appointing two honest house-keepers, who, being sworn, shall value, by the day, the use of such carriages, draught horses and oxen; which valuation, with a certificate from the surveyor, how many days the said things were employed in the work, shall entitle the owner to an allowance for the same, in the next county levy. And, in the like manner, shall the owner of timber, stone or earth, taken for bridges or causeways, be entitled to the valuation thereof, in the next county levy, upon a certificate from the two house-keepers who valued the same. And, hereafter, every surveyor of a road, who shall fail or neglect to perform the du-

ty hereby required of him by law, shall forfeit and pay a sum not less than ten, nor exceeding thirty dollars. And the surveyors of the roads now acting, or that may be hereafter appointed, shall be entitled to receive such reasonable compensation, to be adjudged of by their respective county courts, not exceeding one dollar twenty-five cents for every day they may be necessarily employed in working on, and repairing the said roads, to be paid them out of the county levy.

8. 'The courts of the several counties shall have full power to levy so much money as will be necessary to pay for the removal, by gunpowder, of the obstructions of rock from the public road; and to apply the same in such manner for the purpose aforesaid, as they may deem expedient.'

9. Where a bridge or causey shall be necessary, and the surveyor, with his assistants, cannot make or maintain the same, the court of the county are empowered and required to contract for the building and repairing such bridge or causey, and to levy the charge thereof in their county levy."

The first and most obvious objection to the law, is the inequality and injustice of the manner in which the people are taxed for this great and important public work. It is altogether a *poll tax*—a tax levied upon the laborers of the country, without regard to the property of the tax payers—except in this, that the owner of laboring slaves usually is richer than his neighbor who owns none—though the possession of that kind of property is very far from being a correct measure of wealth. A merchant, manufacturer, or capitalist, (as such) pays not a cent towards the making and repairing our roads, though either may make as much use of them as the farmer and slave holder. The large wagon owner, where capital is altogether employed in the transportation of commodities, and the great mail contractors, and stage coach owners, who make more use of, and derive more profit from the roads than any other persons, are alike free from all contribution for their repairs and preservation. This is as impolitic as it is unjust—and like many other unjust taxes, it is so badly paid, that those exempted from payment by law become in fact the greatest sufferers. The labor for repairing roads is sparingly and grudgingly given, and so injudiciously applied, (for reasons which will hereafter be considered,) that it renders a still less amount of service: and the consequence is, that those who most use the roads, are compelled to pay a heavier tax in extra force of team, than would pay their fair proportion of the expense necessary to keep the roads in the best condition. In this way, we may fairly estimate our roads as among the most expensive in the world, (where natural advantages are equal,) although the money and labor judiciously bestowed for their repairs make a very small amount. This general truth will be evident to every one who has much practical acquaintance with the existing evils, though we may differ widely as to estimates of cost. But there can be little doubt, that any kind of fair and careful estimates will lead to this conclusion—that the present system of repairing roads is as injudicious as unjust—is wasteful of the means applied, and yet ineffectual: and that it is required by the interest of all classes—those exempted by the law from road labor, as well as those who

are taxed to provide it—that a total change of law, and of the mode of operation should be made.

A small exception exists in the law, on the statute book, but not in its actual operation, to the entire exemption of a large part of the community from contributing to the repairs of public roads. The law requires road labor from "all male laboring persons, of the age of sixteen years or more, *except such as are masters of two or more male slaves* of the age of sixteen years or more." Now what is meant precisely by "laboring persons," I do not pretend to know: and if the law was new, and the phrase first so applied, the construction might cause much difficulty. But in practice, it has never been applied to require road labor (or substitutes, or fines in default,) of any who were employed in other than *field labor*. As the white field laborers in Lower Virginia are, unfortunately, very few, the hardship of subjecting these few to road labor was the more glaring—and latterly, they have no longer been called upon for this service—and thus they are exempted, not by an amendment of the law, but by the neglect of its provisions by the surveyors of the roads. In the mountain region, where white laborers are far more numerous, compared to slaves, this mode of repeal, by non-enforcement, has not yet taken place. This odious feature of the law was made much use of by the advocates for the change of our former constitution, to show that the poor had not their proper weight in the government. But as if it had served its only use, and might be wanted to serve the same purpose again, no effort has been since made to change this part of the law—a change, by the way, which might have been obtained as easily under the old as under the new constitution, and which is practically (though illegally) made in that part of the State where the influence of the poor man is said to be least.

R. N.

MONTHLY COMMERCIAL REPORT.

There has been nothing particularly interesting in the commercial operations of the present month, with the exception of those in the great staple article, cotton; the price of which has continued to advance, until it has reached 16 cents in the Petersburg market. This advance is caused by the statements made of extensive injury to the crops, particularly in the Southern Atlantic States, and which was also reported to be the case with those on the Mississippi—but the latter report is contradicted, and some difference of opinion now exists whether the price will be supported, or whether a further advance will ensue. The quantity consumed in Europe is steadily on the increase, and should the recent attempts to supply the Chinese market with British cotton goods prove successful and profitable, a further increase may be counted on, which would prevent a recurrence of very low prices until the production shall overtake the demand.

The season for extensive operations in tobacco has passed, but the price of the article is maintained, and the quantity remaining in this country is smaller than usual.

The short crop of wheat in Virginia has had no effect on the price in the Northern ports, where the immense increase of supplies from the west, through the New York Canal, have furnished

more flour than is required by the limited demand for exportation. Some large sales of flour have been made by the Richmond millers at \$6 per barrel—but the price of country flour is at and under \$5.

The published reports of the importation of specie into the United States since the 1st of December 1833, exhibit an amount of nearly twenty millions of dollars. Recently the importation has ceased, and some silver has been exported. Spanish dollars now command a premium—reversing the state of things which existed previously to the change in the mint value of gold. Exchange on England is at 63 per cent. premium. Virginia Bank stock 110, Farmer's Bank 108. The stock of the Petersburg Rail Road which had been quite low in price, has appreciated nearly to par—a dividend of five per cent. having been ascertained for the last six months.

Nov. 27th, 1834.

x.

MOUNT VESUVIUS.

The most afflicting details of a recent eruption of Mount Vesuvius, have reached us. In a former account we stated that in August an eruption had taken place, which on the evening of the 25th began to subside. On the 27th, 28th, and 29th, new craters opened, and produced ravages awful to contemplate. Thousand of families were flying from their native land, old and young, dragging through heavy masses of heated cinders. Fifteen hundred houses, palaces and other buildings, and 2,500 acres of land, have been destroyed by fire. The village of St. Felix had been already abandoned.

The lava soon poured upon this place, and in the course of an hour, houses, churches, and palaces, were all destroyed. Four villages, some detached houses, country villas, vines, beautiful groves, and gardens, which a few instants before presented a magnificent spectacle, now resembled a sea of fire.

On the third instant, nothing but stones and cinder were ejected, and every prospect existed of the eruption being soon at a close. The palace of the Prince of Attayauno, and 500 acres of his land, are utterly destroyed. The cinders fell during an entire night over Naples, and if the lava had taken that direction, there would have been an end to that city.

From the Cultivator.

EXPENSE OF CURING HAY.

An accurate account of expense in different operations of farming, has heretofore been so little attended to, that in making out an estimate of cost of any one process of the many that are to be performed, the farmer has to be governed more by conjecture than by any rule of correct calculation. This deficiency is owing to his own neglect, and if he now suffers, as he must necessarily, from the evil, a little time and pains are all that are required to enable him hereafter to count the cost of any one process he may wish to have performed. It is as important to the farmer to know what ought to be the reasonable cost to have a piece of work done, as it is for the manufacturer to calculate the expense per lb. or per yard of carding, spinning or weaving, and we are well assured,

that if the last is unacquainted with the expense of each of these processes, he is totally incompetent to carry on his business successfully. It is the same with the mechanic, and that one only, at this day, becomes wealthy, who is competent to make a correct account of profit and cost. Where a farmer does all his own work, it may not be so necessary to keep a debtor or creditor account, but when job work is to be done, as it must in a variety of cases, accuracy of cost is essential to the interest of all engaged. We do not hesitate to say, that a man who would keep a correct account of all the expenses and labor upon a farm, giving a separate page to each laborer, each lot, each horse, ox and cow, with the profits derived from each, and this system kept up for successive years, and extended throughout his whole arrangement, and published, would aid more directly the class of community to which he belonged, and it would give rise to more beneficial results, than the present opening of new canals, or originating other great improvements. We would then be furnished with a guide or table, from which we would calculate the expense of each operation and class of husbandry, and settle the many principles which are now left to reason, and, in many cases, to conjecture. It has been for many years, and is yet, a disputed point among the most intelligent farmers, whether the raising of grain or stock, where there are proportionate facilities for each, is most conducive to their interest, and we do not see that the controversy can be settled in any way, except by keeping the debtor and creditor account we have mentioned. It is useless to enlarge upon this subject. Doubt and uncertainty will always rest upon it, and we suffer from a continuance of the evil, until we adopt a better and more systematic manner of calculating all our expenses and profits. Our object at this time is, to give the expense of cutting hay, and it is as accurate as circumstances would allow. It would be better could we estimate the cost per ton, but as a farmer has not the conveniences, and does not weigh the hay intended for his own consumption, it would be difficult to say, with certainty, what is the cost of curing by weight. It is a common observation, however, that 20 feet square and one foot high of well packed hay, give one ton of 2240 lbs. by weight; how far it is correct, we have never had the opportunity of ascertaining. We have estimated it by the load, and a two horse load, with the wagon, or one with an ox cart, are considered equal—each load we put down as 12 cwt. of well cured hay, such it would turn out from the mow.

Cutting, curing and housing	126 cart	
loads of hay,		\$143 00
do.	124 wagon do.	136 00
do.	38 cart do.	34 37
Total,	288 l'ds costing,	\$313 37

Or \$1 08½ per load.

We give three different statements as the work was done on three different farms, and the first two under the direction of the persons living upon them who were hired tenants, and who employed men to work with and under them—the work was charged at \$1 per day wages and board, which was the actual price. How far the tenants who had no interest in the hay, or were not charged with any part of the payment of the expenses, might, if they had been concerned in either or

both, by greater efficiency, been enabled to lessen the expense, we are unable to say: they were however, as competent as the better kind of day laborers, and as the farms were some distance apart, and there was no communication between the tenants, still the expense for the labor done on each is nearly the same. A revolving horse hay rake was used in both instances, and there was no charge for the use of the team to house the hay. Still we have no doubt that had the owner personally superintended the work, the cost would have been less; because his direct interest in lessening all expenses would have created facilities which did not occur to those less interested. In the last statement given, this was the case, for there we see 38 loads cured for \$34, or about 90 cents per load; whereas the other two cost about \$1 12 per load. We have heretofore made estimates of the expense of curing hay, and have uniformly made them at about \$1 per load. Last year, the expense was rather less than this; for although the weather was not quite so dry for harvesting, yet as the heat was not so intense, laborers were enabled, on the whole, to do more, and this year, a mower had to go over more ground to obtain the same quantity of hay.

EXTRACTS FROM PRIVATE CORRESPONDENCE.

Sumpter, S. C. 10th Oct. 1834.

We are going on well as to rail roads, and with the spirit afloat, and the growing influence of the idea that the labor of the country may be used in lieu of money, gives me hopes that it will not be long before Petersburg and Norfolk will be connected with Charleston by one continued road. But we have also a spirit afloat, tending to a movement by far too rapid, because too expensive—that of an almost immediate use of locomotives.

This circumstance leads me to ask you to obtain for me the information, what has been the course of conduct pursued by the Petersburg and Norfolk Companies? Have they not forborne the use of steam till their work is completed?

I would also say to you that a great impediment exists here as to engineers. No sooner does a boy get the knowledge of the level, than he comes to the South, turns engineer, and charges his \$10 per day. The Columbians paid \$2,000 the other day for surveying sixty miles of ground. It took up twenty-seven days time, was performed by two engineers and thirteen assistants, with one wagon and four horses. Now this sum may be thus divided:

Engineers \$10 per diem each,	\$270 or	\$540
Wagon and team,	-	120
Thirteen assistants \$2 is \$26 per day, or	-	702
Profit,	-	638
		\$2,000

Now, I apprehend in such a country as this, where, on the alluvion, the elevation will not exceed three feet in the mile; and as soon as the leaf falls, you may discover objects for miles, that many an intelligent young man would be able to give himself a good start, and serve companies at a low rate, always stipulating, that in the event of success, the payment should be correspondent; and *perhaps* as it would furnish the best pledge and the

strongest test of his talent and zeal, to agree to take this *addendum* to his pay in road stock.

There is now a distant prospect of a rail road from Darlington Court House direct to Sumterville, and thence to ———, on the Charleston Rail Road, a distance of 120 miles, more or less. From Darlington Court House to Sumpter Court House, as far as Lynch Creek, the road is solid, and the country flat. Below it is flat, but perhaps not so solid. * * * *

Surry County, Oct. 20, 1834.

I take the liberty of sending you some samples of my marl. No. 1 was taken from the upper part of the bank, forming a stratum about four feet thick, and containing a substance in a crystalized state, which I at first supposed to be gypsum, but was soon convinced of my error from its being very easily decomposed by muriatic acid; and I am now at a loss to say what it is, unless it is crystalized lime. Sometimes shells are found with the hollow side up, filled with transparent crystals of a most beautiful appearance. * *

[These crystals were new to our observation—but our correspondent's application of a test led him to a correct conclusion. The substance is crystalized carbonate of lime—and has been thus formed by a previous solution of a portion of the shelly matter by rain water, which (as we are informed) contains carbonic acid, and the excess of this acid present forms a super-carbonate of lime, which is soluble in water. This is the form of the calcareous matter dissolved in limestone water, and which, by losing its excess of acid, is deposited in the crystals which decorate the caverns of limestone regions, and in calcareous tufa at the falls of running streams.]

Fairfax, Nov. 20th, 1834.

* * * * I am negotiating for a large supply of ground bones, and wish you would insert in your following numbers what you may know, or what is said of them. English authority is various: but I have great confidence in it for most things.

Hanover, November 15th, 1834.

* * * * I have been long and successfully employed in the use of shell marl, and had noted, and should have published many of my observations, but the experiments mentioned in your Essay on Calcareous Manures, are so much more exact than mine, and so precisely in accordance with my experience, that there is nothing left for me to say on the subject. This statement I have always made when I have heard your book mentioned. * * *

[This concurrent testimony, even when thus generally and concisely stated, is very satisfactory to the individual to whom it is addressed—but it would add much to the estimated value of this manure, if the detailed experiments alluded to could be laid before the public. We know (from report) that the general and successful practice of our correspondent, together with his ample means for observation, would give his statements, whether general or in detail, a character of authority which would be exceeded by none.]

DIARY OF THE TEMPERATURE AND STATE OF THE WEATHER, FROM JULY 1, TO SEPTEMBER 30, 1894,—OBSERVED AT FORT MONROE.

JULY.	THERMOMETER.			WINDS.	WEATHER.	AUGUST.	THERMOMETER.			WINDS.	WEATHER.	SEPT.	THERMOMETER.			WINDS.	WEATHER.
	VII.	II.	IX.				VII.	II.	IX.				VII.	II.	IX.		
	A.M.	P.M.	P.M.				A.M.	P.M.	P.M.				A.M.	P.M.	P.M.		
1	77	88	80	S.	cloudy.	1	79	84	82	S.W.	fair.	1	77	83	88	N.E.	rain.
2	77	87	84	"	fair.	2	79	76	78	N.W.	fair.	2	76	86	79	N.	fair.
3	77	88	82	"	"	3	74	79	77	N.E.	rain.	3	78	85	82	S.E.	"
4	78	88	78	N.E.	rain.	4	76	83	77	N.	fair.	4	79	84	80	S.	cloudy.
5	78	89	76	"	cloudy.	5	75	80	79	N.W.	"	5	79	82	79	N.	rain.
6	75	87	80	S.	fair.	6	78	81	79	E.	"	6	79	82	84	S.	fair.
7	77	85	80	S.E.	cloudy.	7	78	81	80	"	"	7	81	84	81	"	"
8	78	87	82	"	fair.	8	78	86	81	S.	"	8	79	82	80	"	rain.
9	79	85	83	"	"	9	77	83	83	"	"	9	79	82	80	W.	fair.
10	78	81	78	"	cloudy.	10	81	85	83	N.	"	10	74	77	75	S.W.	"
11	75	82	73	N.E.	rain.	11	82	89	86	S.W.	"	11	73	74	69	N.W.	"
12	69	75	73	"	"	12	83	88	86	S.	"	12	70	71	70	"	"
13	71	78	76	"	"	13	83	87	87	"	"	13	69	70	70	N.	"
14	75	84	80	S.W.	fair.	14	84	86	88	N.E.	cloudy.	14	69	70	69	N.E.	"
15	76	83	78	"	rain.	15	83	85	82	N.	fair.	15	69	72	71	"	"
16	77	85	79	S.	"	16	77	78	77	"	"	16	71	72	72	N.	cloudy.
17	74	84	80	S.W.	"	17	77	78	78	S.W.	"	17	72	77	74	S.E.	"
18	70	80	76	N.E.	"	18	77	84	82	N.E.	"	18	71	75	73	S.W.	"
19	70	78	75	"	"	19	82	78	76	N.	"	19	72	75	75	N.E.	fair.
20	72	76	77	E.	fair.	20	75	75	74	E.	"	20	72	74	73	S.E.	rain.
21	72	80	79	"	cloudy.	21	75	77	76	S.E.	"	21	73	76	75	S.W.	fair.
22	76	91	82	S.	fair.	22	75	78	77	"	"	22	73	74	74	"	cloudy.
23	80	87	84	N.E.	"	23	76	78	77	E.	"	23	74	76	76	N.E.	rain.
24	81	85	83	"	"	24	78	84	82	"	"	24	72	71	70	"	cloudy.
25	75	88	84	W.	"	25	78	78	77	N.E.	cloudy.	25	69	71	70	"	rain.
26	82	87	85	E.	"	26	76	79	76	"	"	26	70	74	71	N.W.	rain.
27	81	92	86	"	"	27	72	72	72	E.	"	27	71	73	72	S.W.	cloudy.
28	84	87	82	N.E.	cloudy.	28	74	77	75	"	"	28	72	74	69	N.	rain.
29	83	90	84	W.	"	29	73	76	76	"	"	29	60	74	63	"	cloudy.
30	82	88	80	"	"	30	75	79	76	"	"	30	62	66	68	S.W.	"
31	80	81	79	S.	"	31	76	76	75	"	rain.	31					
Total No. of degrees.						Total No. of degrees.						Total No. of degrees.					

of too great an influence over the future increasing condition of the ox; and as long as there are so many points to be considered, and as most of them may be partially altered by local circumstances, a difference of opinion may exist among judges of lean stock.

Now, what are those *points* of an ox, a thorough knowledge of which is so essential to constitute a perfect judge? Could they be described and illustrated with such precision, as that they may be applied at once to every ox, in whatever condition it may be, a great advancement would be made towards establishing fixed rules for the right judging of all the domestic animals. Fortunately for the suppression of human dogmatism on this subject, nature herself has furnished rules for ascertaining points for judgement, which can only be discovered by long and constant practice. Nevertheless, I shall endeavor to describe them plainly, and after perusing the description, I hope my readers will perceive that they are established laws of nature; and are therefore unerring and applicable to every species of cattle. Like other phenomena of nature, a knowledge of them can be acquired by observation. This knowledge is the most difficult which a farmer has to acquire, inasmuch as the management of live-stock is a much more difficult branch of husbandry than the cultivation of corn. And although the importance of this knowledge is acknowledged by every experienced farmer, and a desire for its acquirement is strongly felt by every young one, it is remarkable that very little is said in professed works on agriculture on those rules which guide us in judging of fat or lean live-stock.

The first *point* to be ascertained in examining an ox is the *purity* of its breed, whatever that breed may be. The ascertainment of the purity of the breed will give the degree of the disposition to fatten in the individuals of that breed. The purity of the breed may be ascertained from several marks. The color or colors of the skin of a pure breed of cattle, whatever those colors are, are always definite. The color of the bald skin on the nose, and around the eyes, in a pure breed, is always definite, and without spots. This last is an essential *point*. When horns exist, they should be smooth, small, tapering, and sharp-pointed, long or short, according to the breed, and of a white color throughout in some breeds, and tipped with black in others. The shape of the horn is a less essential point than the color.

Applying these marks on the different breeds in Scotland as illustrations of the points which we have been considering, we have the definite colors of white and red in the short-horns. The color is either entirely white or entirely red, or the one or the other predominates in their mixture. The skin on the nose and around the eyes is uniformly of a rich cream-color. The Ayrshire breed in its purity is also distinguished by the red and white color of the skin, but always mixed, and the mixture consists of spots of greater or smaller size, not blended together. The color of the skin on the nose and around the eyes is not definite, but generally black, or cream-colored. In other points, those two celebrated breeds differ from one another more than in the characters which I have just described. In the West Highland, Angus, and Galloway breeds, the color of the skin is mostly black in the animals of the purest blood, although

red, dun, and brindled colors, are occasionally to be seen among them. The black color of the skin of the nose and around the eyes is indicative of the pure blood of black colored cattle, but a cream-colored nose may frequently be observed among the other colors of skin. It would perhaps be hazardous to assert, in the case of the West Highlanders, that the characters above given are the only true indications of the pure breed, for their origin cannot now be certainly determined; but the characters given will certainly apply to the purity of the blood in the Short-horn and Ayrshire breeds.

The second *point* to be ascertained in an ox is the form of its carcass. It is found, the nearer the section of the carcass of a fat ox, taken longitudinally vertical, transversely vertical, and horizontally, approaches to the figure of a parallelogram, the greater quantity of flesh will it carry within the same measurement. That the carcass may fill up the parallelogram as well as its rounded form is capable of filling up a right-angled figure, it should possess the following configuration. The back should be straight from the top of the shoulder to the tail. The tail should fall perpendicularly from the line of the back. The buttocks and twist should be well filled out. The brisket should project to a line dropped from the middle of the neck. The belly should be straight longitudinally, and round laterally, and filled at the flanks. The ribs should be round, and should project horizontally, and at right angles to the back. The hooks should be wide and flat; and the rump, from the tail to the hooks, should also be flat and well filled. The quarter, from the itch-bone to the hook, should be long. The loin bones should be long, broad, and flat, and well filled; but the space betwixt the hooks and the short-ribs should be rather short, and well arched over with a thickness of beef between the hooks. A long hollow from the hooks to the short-ribs indicates a weak constitution, and an indifferent thriver. From the loin to the shoulder-blade should be nearly of one breadth; and from thence it should taper a little to the front of the shoulder. The neck-vein should be well filled forward, to complete the line from the neck to the brisket. The covering on the shoulder-blade should be as full out as the buttocks. The middle-ribs should be well filled, to complete the line from the shoulders to the buttocks along the projection of the outside of the ribs.

These constitute all the *points* which are essential to a *fat* ox, and which it is the business of the judge to know, and by which he must anticipate whether the lean one, when fed, would realise. The remaining points are more applicable in judging of a lean than a fat ox.

The first of the *points* in judging of a *lean* ox, is the nature of the *bone*. A round thick bone indicates both a slow feeder, and an inferior description of flesh. A flat bone, when seen on a side view, and narrow, when viewed either from behind or before the animal, indicates the opposite properties of a round bone. The whole bones in the carcass should bear a small proportion in bulk and weight to the flesh, the bones being only required as a support to the flesh. The texture of the bone should be small-grained and hard. The bones of the head should be fine and clean, and only covered with skin and muscle, and not with lumps of fat and flesh, which always give a heavy

headed dull appearance to an ox. The forearm and hock should also be clean and full of muscle, to endure travelling. Large joints indicate bad feeders. The neck of an ox should be, contrary to that of the sheep, small from the back of the head to the middle of the neck. The reason of the difference, in this respect, betwixt the ox and the sheep, is, that the state of the neck of the ox has no effect on the strength of the spine.

A full, clear, and prominent eye is another point to be considered; because it is a nice indication of good breeding. It is always attendant on fine bone. The expression of the eye is an excellent index of many properties in the ox. A dull heavy eye certainly indicates a slow feeder. A rolling eye, showing much white, is expressive of a restless capricious disposition, which is incompatible with quiet feeding. A calm, complacent expression of eye and face is strongly indicative of a sweet and patient disposition, and, of course, kindly feeding. The eye is frequently a faithful index of the state of the health. A cheerful clear eye accompanies good health; a constantly dull one proves the probable existence of some internal lingering disease. The dulness of eye, arising from the effect of internal disease, is, however, quite different in character from a natural or constitutional phlegmatic dulness.

The state of the skin is the next point to be ascertained. The skin affords what is technically and emphatically called the *touch*,—a criterion second to none in judging of the feeding properties of an ox. The touch may be good or bad, fine or harsh, or, as it is often termed, hard or mellow. A thick firm skin, which is generally covered with a thick set, hard, short hair, always touches hard, and indicates a bad feeder. A thin, meagre, papery skin, covered with thin silky hair, being the opposite of the one just described, does not, however, afford a good touch. Such a skin is indicative of weakness of constitution, though of good feeding properties. A perfect touch will be found with a thick, loose skin, floating, as it were, on a layer of soft fat, yielding to the least pressure, and springing back towards the fingers like a piece of soft, thick, chamois leather, and covered with thick, glossy, soft hair. Such a collection of hair looks rich and beautiful, and seems warm and comfortable to the animal. It is not unlike a bed of fine soft moss, and hence such a skin is frequently styled "mossy." The sensation derived from feeling a fine touch is pleasureable, and even delightful, to an amateur of breeding. You cannot help liking the animal that possesses a fine touch. Along with it is generally associated a fine symmetrical form. A knowledge of touch can only be acquired by long practice; but, after having acquired it, it is of itself a sufficient means of judging of the feeding quality of the ox; because, when present, the properties of symmetrical form, fine bone, sweet disposition, and purity of blood, are the general accompaniments.

These are the essential points of judging lean cattle; but there are other and important considerations which must claim the attention of the judge, in forming a thorough judgement of the ox.

The proportion which the extremities bear to the body, and to one another, is one of these considerations. The head of the ox should be small, and set on the neck as if it appeared to be easily carried by the animal. This consideration is of

great importance in showing cattle to advantage in the market. The face should be long from the eyes to the point of the nose. No face can be handsome without this feature. The skull should be broad across the eyes, and only contract a little above them, but should taper considerably below them to the nose. The muzzle should be fine and small, and the nostrils capacious. The crown of the head should be flat and strong, and the horns should protrude horizontally from both sides of it, though the direction of the growth from the middle to the tip varies in the different breeds. The ears should be large, stand a little erect, and so thin as to reflect the bright sun-light through them. The neck should be light, tapering from the front of the shoulder and neck-vein, with a gradual rise from the top of the shoulder to the head. The length of the neck should be in proportion to the other parts of the animal; but this is a non-essential point, though I would prefer an apparently short neck to a long one, because it is generally well covered with the neck-vein. A droop of the neck, from the top of the shoulder to the head, indicates a weakness of constitution, arising frequently from breeding too near akin. The legs below the knee should be rather short than long, and clean made. They should be placed where they apparently bear the weight of the body most easily, and they should stand wide asunder. The tail should be rather thick than otherwise, as thickness indicates a strong spine and a good weigher. It should be provided with a large tuft of long hair.

The position of the flesh on the carcass is another great consideration in judging of the ox, the flesh on the different parts of the ox being of various qualities. That part called the spare-rib in Edinburgh, and the fore and middle ribs in London, the loins, and the rump or hookbone, are of the finest quality, and are generally used for roasts and steaks. Consequently the ox which carries the largest quantity of beef on these points is the most valuable. Flesh of fine quality is actually of a finer texture in the fibre than coarse flesh. It also contains fat in the tissue between the fibres. This arrangement of the fat and lean gives a richness and delicacy to the flesh. The other parts, though not all of the same quality, are used for salting and making soups, and do not fetch so high a price as the parts just described.

A full twist lining the division between the hams, called the "closing," with a thick layer of fat, a thick flank, and a full neck-vein, are generally indicative of tallow in the interior of the carcass; but it frequently happens, that all these symptoms of laying on the internal fat fail. The disposition to lay on internal fat altogether depends on the nature of the individual constitution; for, it is often observed, that those individuals which exhibit great fattening points on the exterior, do not fill with internal fat so well as others which want these points. On the contrary, thin made oxen, with flat ribs, and large bellies, very frequently produce large quantities of internal fat.

The first part which shows the fat in a feeding ox, is the point or top of the rump, which, in high-bred animals, is a prominent point; sometimes it protrudes too much, as the mass of fat laid on these is out of proportion to the lean, and therefore useless to the consumer. This is the part which frequently misleads young or inexperienced judges in the true fatness of the ox, because fat

may be felt on this part, when it is very deficient on most of the other points.

The parts, on the other hand, which are generally the last in being covered with flesh, are the point of the shoulder-joint, and the top of the shoulder. If these parts are, therefore, felt to be well covered, the other and better parts of the animal may be considered ripe. Ripeness of condition, however, can only be rightly ascertained by handling, for there is a great difference between the *apparent* and *real* fatness of an ox. The flesh of an apparently fat ox to the eye, may, on being handled by a judge, feel loose and flabby; but a truly fat ox always feels "hard fat." With such the butcher is seldom deceived, while loose handlers give no assurance of killing well.

It is proper, in judging of the weight of a fat ox, to view his gait while walking towards you, which will, if the ox has been well fed, be accompanied with a heavy rolling tread on the ground. In this way a judge can at once come very near to its weight.

The application of all these rules and considerations to the judging of *lean* stock, constitutes the chief difficulty to the judge. An ox, in high condition in so far as its condition alone is under consideration, can be judged of, as we have seen, by any one; and sometimes the fatness may be so great as obviously to deform the symmetry to any observer. The superiority of a judge to others, in these cases, consists in estimating the weight, observing the purity of the blood, and valuing the points of the animal. But in judging of a lean ox, its future condition and symmetry must be foreseen. The rules which I have attempted to describe, will, if studied practically, enable an inquiring observer to foresee these points; and in judging between a number of valuable points, it should be remembered, that purity of breeding will always insure aptitude to fatten, which, in its turn, will insure the largest remuneration for the food consumed.

Sheep, both fat and lean, may be judged of by nearly the same rules. The purity of breeding will be seen in the large full prominent eyes, the clean thin bone of the head and legs, and the large thin pricked up ears, set on each side of the top of the head, and in the short, thick, smooth, clear hair of the face and legs. The section of the form of the fat sheep is even more mathematically like a parallelogram than that of the fat ox. The touch of the skin is also the same in kind, and is as sure an indication of the disposition to fatten as in the ox. In regard that wool varies so greatly in the many breeds of sheep, I can only make this general remark on the fleece best suited to every breed, namely, the whole body should be well covered with wool, with the exception of the face and legs, which are always covered with hair. A large covering of wool, not only protects them against the inclemencies of the weather, and the coldness and dampness of the ground, but it supplies a large fleece to be disposed of to the wool buyer. One deviation from the rules of judging cattle, must be made while judging sheep, to which I have already alluded, namely, while the neck of the ox should be thin, that of the sheep should be thick; because a thin necked sheep is found to possess a weak spine, and is generally a bad feeder. A thin neck has thus the same effects on sheep that a small tail has on cattle. As in cattle, a droop-

ing neck in sheep indicates a weakness of constitution, arising from breeding in and in.

Some of the rules for cattle and sheep are applicable to swine. Swine should have broad straight backs, round ribs, thin hair, thin skin, small tails, short and fine muscles, pricked ears, small and fine bones, and round and well turned shoulders and hams.

In conclusion, it is obvious that these rules for judging live-stock are not founded upon arbitrary assumptions. Had no *natural* means of judging existed, man could no doubt have contrived rules to suit his own convenience; and in such a case, he would probably have chosen such as he could have most easily applied; but unless they could be applied to the *growing*, as well as the *mature* condition of animals, they would be of little value. But we have seen that natural means of judging *do* exist, and although they cannot be easily understood without much observation and practice, yet, by practice, they can be acquired, and easily applied to the existing circumstances of the animal, whatever these may be. Any person, it is true, cannot at once perceive that their necessary tendency is to lead to a correct judgement. Long and careful personal observation is requisite to convince the mind of their value in that respect. Tuition, without practical observation, cannot of itself do it. It has been the study of nature, in short, which has enabled man to establish these rules for his guidance; and as all the operations of nature are regulated by general laws, these rules must be of universal application. It is clearly established by observation, as a uniform principle of judgement, that when an ox, in a growing state, presents a certain degree of purity of breeding, a certain form of body, and a certain kind of handling of its skin, a certain result is undeviatingly exhibited in the mature state from these given premonitory symptoms. Should this result conduce to the acquisition of wealth, we are anxious to possess the growing animal which exhibits such favorable points; and, on the other hand, we are as anxious to avoid the possession of that animal which exhibits unfavorable points, unless at a very depreciated value. Now, it has been ascertained by experience, that pure breeding, perfect form, and fine touch, make the best mature animal. Hence *these points* will insure both the growing and the mature animal a ready market and a good price; and hence also, that breed which constantly presents these points, deserves, by its intrinsic worth, to be generally cultivated.

From the New England Farmer.

CUT AND UNCUT POTATOES FOR PLANTING.

Mr. Fessenden—The following details of an experiment to ascertain the relative advantage of planting cut or uncut potatoes is at your service for publication if you think it of sufficient importance.

I planted this year alternate rows of cut and uncut potatoes. I put four pieces into each hill of the cut potatoes and two potatoes into each hill of the whole potatoes. The hills were three feet apart, each way, and of course the number of hills in an acre was 4840. The produce of the rows, planted with cut potatoes was at the rate of three hundred and fifty-five bushels the acre, or twenty-

three thousand five hundred and twenty pounds. The produce of the rows planted with whole potatoes was at the rate of four-hundred and fifty-eight bushels or thirty-two thousand and sixty pounds. The difference in the crop in favor of whole potatoes was at the rate of one-hundred and twenty-two bushels the acre, but as there were twenty-two bushels more of seed the acre used in planting the whole potatoes the nett gain was only one-hundred bushels. However, as one bushel of potatoes at the season of planting is usually worth two bushels at harvest time, it will be more accurate to calculate the gain at seventy-eight bushels. The kind of potatoes planted was the "*white blue nose*" which is decidedly the best potato for the table I have ever cultivated, though a moderate bearer unless it receive generous treatment.

Ellsworth, (Me.) 3d Nov. 1834.

For the Farmers' Register.

**PETITION FOR AN AMENDMENT OF THE LAW
RESPECTING ENCLOSURES, ON MARGINS OF
THE NAVIGABLE TIDE WATERS OF JAMES
RIVER.**

[Lest it should be supposed that the appearance of the following petition indicates some opposition to the former one asking for a more general change in the law of enclosures, it is proper to state that the two petitions originated with different persons, and in distant parts of the country—and though without concert, and asking for relief in different modes, the two petitions, so far from being in conflict, will serve to aid each other's object. Public notice was advertised of the intention of offering this petition, some months before the publication of the other.]

To the General Assembly of Virginia.

The petition of the subscribers respectfully sheweth:

That your petitioners are owners or occupiers of land lying on, and partly bounded by, the navigable tide waters of James River, or some of its tributary streams.

That in addition to the hardship and injustice which, in common with most of our fellow citizens, we suffer from the general operation of the law respecting enclosures, (which general hardships we do not mean here to discuss,) your petitioners are subjected to other and peculiar injuries, from which they may be easily secured by legislative interposition, without any loss or disadvantage to the community in general, and without inflicting wrong on any individual citizen whatever.

That by the existing law, the navigable rivers and their creeks and tributaries, however wide and deep, are not *legally* a barrier against the trespasses of live stock from neighboring lands—and therefore that the water boundaries of farms must be kept covered by a "lawful fence," or the owner of the land be subject to suffer, without redress, any extent of depredations from mischievous animals.

The great width of the Lower James River makes it in most places, an actual and sufficient obstruction to the crossing of animals—and therefore the land owners may, and often do, dispense with fences along the shores, by making "water

fences" jutting into the river, or creeks, to such distances as circumstances require and permit. But these jutting fences are not only very expensive and difficult to construct, and to secure from destruction by storms, but they are not legal substitutes for complete enclosures, and he who uses them does so at his peril—and he can have no redress for any depredations of animals trespassing on a field fenced partly in this manner, because it is not under a "lawful enclosure."

But greater evils are felt where the waters, though deep, are more narrow. There also, generally, all stock, except hogs, are effectually kept from passing, by the miry nature of the bottom and margins of the creeks. But hogs cannot be stopped by these obstacles, nor by any depth of water, nor even by a considerable width, as well as depth: and if a field of 100 acres was thus exposed to the encroachment of a single hog trained to mischief, there would be no legal remedy, or safeguard, except fencing the whole water line.

The fences thus required by the law along the margins of rivers and navigable creeks, are by far the most expensive in our part of Virginia, where fencing has become generally a most burdensome tax on agriculture. The adjacent lands in almost every case are divested of all timber suitable for fencing, which makes it necessary to bring it from distant places: most of the water lines are marshy, or otherwise not easily accessible to carts: and withal so crooked as often to need fences of double the length of straight courses: and after being constructed at such great expense, fences in these places are immediately and always in danger from storms, high tides, and the concealed attacks of mischievous hogs, or their owners who may desire to profit by such depredations.

If there was any compensating benefit (by whomsoever it might be received) for all the waste of fencing along the borders of deep tide water, we should hesitate to ask your honorable body for this boon, however great its value would be to us. But in fact, the granting of our prayer for relief will encroach on no man's rights, and scarcely in the slightest degree on any one's interest, whether that interest be in the use of his own, or of his neighbor's fields. The scanty supply of food obtained by live stock along the margins of rivers and creeks, and from which they might be debarred by the desired change in the law, is scarcely worth as much as the expense and risk incurred by stock being allowed to range at large in such places: and the whole profit thus derived from stock, is certainly not equal to the tenth part of the expense of the fencing which is now necessary for gaining that profit, and for no other purpose.

We therefore pray of your honorable body that the general provisions of the law passed at the last session, which makes the Upper Appomattox a lawful fence, may be extended to all parts of the tide waters of James River, its creeks and tributary streams, navigable by vessels drawing four feet depth of water—and that "stops," or "water fences," under proper regulations, may be made lawful fences between the adjoining lands, on the same side of a water course.

All which is respectfully submitted.

OBSERVATIONS AND QUERIES RESPECTING
ARTESIAN WELLS.

To the Editor of the Farmers' Register.

William and Mary College, Nov. 18, 1834.

The process of boring for water which of late years has been practiced with so much success in many parts of Europe and this country, has furnished scientific inquirers with an opportunity of verifying one of the most important truths which modern investigation has disclosed. I allude to the existence of very intense heat at great depths in the earth, and the progressive diminution of temperature in approaching the surface. This view of the interior condition of the globe, though by no means of modern origin, has, until a comparatively recent time, been deservedly classed with the thousand other speculations concerning our planet, to which the ingenuity and eloquence of theorists have given temporary celebrity. But in the present day, the doctrine has assumed a more imposing attitude. Even in its reference to the entire mass of the earth, it is sustained by the concurrent evidence of a multitude of facts, while so far as it relates to depths which observation has actually explored, it has acquired the character of *established truth*.

It is now very generally admitted, that the temperature of the earth, at great depths, is much higher than at the surface, and that the increase begins to be perceived as soon as we penetrate below the limit at which external impressions of temperature become insensible. The numerous observations which have been made of late years in the mines and Artesian Wells of Europe, have not only established the general fact of an increasing temperature, but have determined for many places in Great Britain and on the Continent, the precise depth at which the augmentation begins, and the rate of increase which subsequently occurs. But as yet I believe no observations of a similar nature have been made in this country, though the number and depth of our Artesian Wells would seem naturally to invite attention to the subject. In Western Virginia, Alabama, and some of the Northern States, this investigation might be carried on with great success. Nor should it be objected, that these researches are only matters of scientific curiosity, and that they cannot be subservient to any useful purpose. Much that is valuable might flow from a careful examination of temperatures and other circumstances connected with our Artesian Wells. Discoveries bearing upon the economy of these wells have actually attended such researches in some parts of Europe, and there are doubtless others still to be achieved. Nor is it unreasonable to expect even useful lights in agriculture from an accurate investigation of the temperatures of the superficial strata of the globe. Already observations of an analogous nature have disclosed the curious and important truth that in high latitudes the near temperature of the earth is less diminished than that of the atmosphere, and hence Wahlenberg, and after him Kupffer, have explained the fact that many deep-rooted plants and trees attain a vigorous growth in situations where, from the general coldness of the air, it would be thought impossible for them to exist.

In the hope that some of your readers either in our western counties, or in Alabama, may be induced to institute observations on the salt wells or

other borings, as well as the ordinary springs in their vicinity, I have drawn up a list of inquiries, embracing several subjects to which their attention might be advantageously directed. It will be seen that only part of these relate to the *temperature* of the wells. The others refer to various points of examination either interesting on account of their probable bearing upon the former, or from their own intrinsic importance in a scientific, as well as practical point of view. In connection with the enumeration of these several points of inquiry, directions and explanations are added for the benefit of the observer, together with such facts, derived from observations abroad, as are likely to furnish a guide to researches in our own country. The subjects to which I would here solicit investigation are embraced in the following queries.

1. What is the general temperature of the ordinary springs in the vicinity?

In reference to this query I would remark, that in comparing the temperatures at different depths in the earth with the temperature at the surface, it is necessary that the *mean temperature* of the surface should first be ascertained. To do this with great accuracy requires a series of observations with the thermometer, continued for many years, and made at short intervals. But as this could not in general be expected, an approximation may be obtained, by observing the temperature of the springs, in the neighborhood, particularly, such as issue from a considerable depth. Of course, much caution will be necessary in the selection of springs for observation, and in some districts it will be almost impracticable to find any whose temperature would correspond to the mean of that at the surface. Such a difficulty, for instance, would occur in some neighborhoods among our mountains, where mineral springs of various temperatures abound. But even there the freestone and limestone springs which have obtained their steady temperature by percolation through the superficial strata of sandstone and calcareous rock, would generally furnish a very close approximation to the mean. In less broken regions, where the springs are fed from deep strata of gravel, sand, and clay, their temperature is uniform throughout extensive districts, and approaches very nearly to the mean of superficial heat. Of course, such springs as will give this mean, must preserve their temperature unchanged throughout the year. If, therefore, observations made at different seasons, indicate any considerable variation in the temperature of a spring, no exact inference as to the mean can be deduced from a single observation. But if the variation be very small, as for instance, one or two degrees at opposite periods of the year, the mean may be very closely approached by taking the average or half-sum of the two extreme temperatures. Indeed, this method might frequently be resorted to with advantage, as a substitute for numerous atmospheric observations. As the impressions of external temperature travel downwards at a very slow rate, we should not expect to find even comparatively superficial springs promptly sympathizing in the changes that occur above. Moreover, as these impressions grow fainter in their progress through the earth, and at length become entirely imperceptible, the fluctuation of temperature in springs even at a depth of twenty feet will present but a small fraction of the corresponding variation at the surface. It appears therefore, that

a few observations, made upon springs, will be of greater use in determining the mean annual temperature of a place, than a great number, made in the ordinary way, by exposing the thermometer to the air. In reference to this topic, it may be remarked, in conclusion, that the determination of this mean is far from being unimportant to the agriculturist; for it contributes a large item to his knowledge of *climate*, and as we all know climate is continually influencing the results of his operations, and should be thoroughly understood, to secure them the highest attainable success.

2. What are the general features of the surrounding country?

3. What rocks show themselves in the neighborhood, and how are they disposed? If inclined, in what direction do they dip?

4. Through what strata does the well or boring penetrate, and what is the thickness of each stratum?

The investigations here suggested, though destitute of any immediate practical use, of which the farmer might avail himself, are, nevertheless, of a nature to interest him from the light which they may throw upon the origin and peculiar character of the springs and Artesian Wells in his vicinity. In a geological point of view, they are of the utmost importance, and such is the growing connection between *geology* and *agriculture*, that whatever promotes the one must either now, or at some future day, contribute to the advancement of the other.

5. To what height does the water rise in the well, and is its height uniform or fluctuating? If the latter, in what conditions of the weather, or other influencing circumstances, does it rise and fall?

6. What is the character of the water? Is it like that of the common springs in the vicinity, or, if not, in what respects is it peculiar?

7. Is any gaseous matter discharged with the water? If so, what is its nature?

A chemical analysis of the gas thus evolved, would not, in general, be practicable, but the determination of one or two of its most obvious properties would not be attended with any great difficulty, and might suffice to determine its nature. Thus its *odor*, if it possess any, its effect upon a lighted taper, its absorbability by cold water, and its effect upon the color of a slip of paper moistened with a solution of sugar of lead, would be matters of very ready observation.

8. What is the temperature of the water at the surface, and at successive depths of 50, 100, 150, &c. feet?

Allusion has already been made to the interesting fact of an increased temperature at great depths below the surface of the earth. This increase, as was before intimated, does not begin until we pass the limit at which the impressions transmitted from the surface become insensible. Of course, the distance of this limit from the surface, will vary with the nature of the intervening strata, being greatest always in those soils which most readily transmit the temperature from above. According to the observations which have been continued for the last fifty years in the caves beneath the Observatory in Paris, the temperature at the depth of eighty-three feet, has, during this long period, remained perfectly uniform; being by the

Centigrade scale, 11.82 degrees or 53° 27 by that of Fahrenheit.

Comparative observations at depths of from one to fifteen feet, have been made at Edinburgh, Strasburg and Zurich, and the mean temperatures at these depths ascertained for each month in the year. From these it would appear, that even at the depth of a few feet the annual variation of temperature is very much reduced. Thus at Edinburgh, the mean temperature of the hottest month by a thermometer in the air, being 59° 36, and that of the coldest by the same instrument 38° 3, the corresponding mean temperatures at the depth of eight feet below the surface were respectively 50° and 42°—thus giving for the annual variation on the surface 20°, and for that at eight feet below only 8°. Again at Strasburg, the warmest month having a mean of 62° 6, and the coldest of 28° 4 at the surface—these means at the depth of fifteen were respectively 52° 8 and 43° 8—giving an annual variation at this depth but little exceeding one-fourth of that at the surface.

In looking over these observations, it is interesting to remark the successive arrival at a given depth of the impressions of temperature from above, *long after these impressions have declined or ceased upon the surface*. Thus, even at the depth of eight feet, the highest temperature is not experienced until September, and the lowest until February. Winter and summer, as it were, arriving a month or more after they have occurred above.

It is obvious from these statements, that changes of season become imperceptible at a comparatively small distance beneath the soil, and that the climate of the earth at the depth of 50 or 100 feet is perfectly uniform throughout the year. Hence springs issuing from this region may be expected to present little or no variation in their temperature. Beneath the depth at which this uniformity first becomes manifest, it has already been said, that the temperature progressively increases as we descend. A statement of some of the evidences by which this curious law has been established, may not prove unacceptable or useless to such of your readers as are interested in the observations to which this communication particularly refers.

Gensanne, who was the first to experiment upon the comparative temperatures at different depths, obtained in the lead mines of Giromagny the following results.

At a depth of 101 metres the temperature was		
		12° 5 Centigrade.
206 "		13 1 "
308 "		19 0 "
433 "		22 7 "

Sanssure in the salt pits of Berne found at a depth of 108 metres, a temperature of 14° 4 Centigrade		
183 "		15 6 "
220 "		17 4 "

The observations of Cordier, a celebrated French geologist, being among the most complete and satisfactory that have yet been published, may with propriety be here transcribed. They were made in the three great coal mines of Carneau, Littry and Decise, and the temperatures were obtained both from the rocks and springs at different depths.

Carneauz.

	Depth.	Temp. Cent.
Water of the well Veriac,	6 2 metres	12° 9
Water of the well Bigorre,	11 5 "	13 15
Rock at the bottom of Ravin mine,	181 9 "	17 1
Rock at the bottom of Castellan mine,	192 "	19 5

Littry.

Surface,	0	"	11
Rock at the bottom of St. Charles mine,	90	"	16 135

Decise.

Water of the well Pelisson,	8 8	"	11 4
Water of the Puits des Pavillons,	16 9	"	11 67
Rock in the Jacobè mine,	107	"	17 78
" " "	171	"	22 1

These observations were made with extreme care, so as to avoid the influence of all local causes that might vitiate the results.

To these might be added the numerous and accurate observations of Daubuisson in Saxony and Brittany—De Trebra in the former, and Fox in Cornwall. Our own continent has, as yet, witnessed but a single observation of the kind; one made by the learned and enterprising Humboldt in the silver mine of Guanaxuato in Mexico. This observation is chiefly valuable on account of the great depth at which it was made, viz: 522 metres, or nearly 1800 feet. The mean temperature at the surface being 60° 4 of Fahrenheit; he found the thermometer below to stand at the enormous height of 96° 44.

But the experiments bearing most directly on the query last proposed, are those which have been made in various Artesian Wells in Europe.

The following results were obtained by M. De Bellevue, in a well of this description on the sea side near Rochelle.

The well at the time of the first experiment was 3½ inches in diameter, and 316 feet deep; filled with brackish stagnant water to the height of 294 feet. The external air being at 51° Fahrenheit, the thermometer after remaining at the bottom 24 hours stood at 61°. At eleven feet below the surface the water had a temperature of 56° 6. The same well being afterwards sunk to 370 feet the thermometer, after standing 25 hours, showed a temperature of 64° 6; making an increase of 3° 6 for an additional depth of 54 feet. A repetition of the observations gave precisely the same result.

An Artesian Well in the neighborhood of Vienna gave the following temperatures.

Mean temperature at the surface.	50° 44 Fahr.
At a depth of 62 20 feet	52 25 "
do. 111 68 do.	52 90 "
do. 300 42 do.	56 93 "

Another at Epinay gave,

At the depth of	30 37 feet	51° 8 Fahr.
do.	177 76 do.	55 94 do.
do.	219 45 do.	57 20 do.

In these observations the depths were estimated in metres, and the temperatures measured on the Centigrade scale. I have reduced the former to English feet, and the latter to degrees of Fahrenheit, for the sake of a more convenient comparison,

with observations which may hereafter be made in this country.

From a review of the observations above recorded, it will be apparent that although in every instance the temperature increases with the depth, the rate of this augmentation is not the same at different places.

The following table exhibiting the depth in English feet corresponding to a rise of one degree of Fahrenheit, has been calculated from the numbers given in Pouillet's *Elements De Meteorologie*.

In France.

At Decise,	27 30 feet.
At Littry,	34 58 do.
At Observatory in Paris,	50 96 do.
At Carneauz,	63 70 do.
At Brittany.	72 80 do.

In Switzerland.

Near Bex,	47 32 feet.
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In Saxony.

The mean of several mines, 72 80 feet,

In England.

Cornwall and Devonshire, 45 50 feet.

In America.

At Guanaxuato, 45 50 feet.

In the Artesian Well near Rochelle, to which we have already referred, the rate of augmentation was still more considerable than in either of the above examples. There the thermometer rose 3° 6' by an increase of depth amounting to 54 feet—which is at the rate of one degree to 15 feet.

Certainly no fact can be more curious or interesting than the comparatively high temperature of the water in the lower parts of these wells. From the known tendency of warm water to ascend and give place to that which is colder, it is evident that unless there existed some permanent source of heat at the bottom and sides of the well, the distribution of temperature which has been observed could not continue for any length of time—and hence these experiments furnish convincing evidence of a regularly augmenting temperature in proportion to the depth.

The observations hitherto made on the temperature of Artesian Wells, have, as we have already stated, been confined to Europe, and have embraced no very great range of depth. Many of the borings in the United States afford an opportunity of obtaining a much wider extent of comparison, and would therefore, no doubt, furnish still more interesting results. Assuredly this consideration ought to be sufficient to invite all who are favorably circumstanced to engage in the investigation. The time and labor necessary for such a course of observations, would be inconsiderable, when compared with the important bearings of the inquiry, and even supposing that a minute degree of accuracy should not be found practicable—great interest will attach to the rudest approximate result. The following hints as to the mode of observation will, it is hoped, be useful in furthering inquiry.

In order to discover the exact temperature of the water at any considerable depth, the thermometer which is let down ought, if possible, to be pro-

tected from the influence of the cooler water above, through which it must be raised at every observation. Otherwise, its temperature will fall as it is drawn up to the surface, and it will only indicate *in part* the heat that prevails below. One of the best means of preventing this effect, would be to enclose the instrument in a thick strong case of glass, and fill the vacant space around it with dry powdered charcoal or finely carded wool laid loosely in. The case should be so tight as to prevent the entrance of the water. But as a case of this description could not be readily obtained unless by special order at a glass house, a good substitute could be constructed by enclosing a hollow cylinder of baked wood in a water tight covering of sheet iron or lead. The wooden cylinder should have a top and bottom of the same material, the former capable of being screwed off and on. The metallic envelope should also have a moveable top, and should be so much larger than the wooden cylinder within, as to allow a packing of powdered charcoal between them. The thermometer, contained in the inner vessel, should be surrounded with a packing of the same material. Thus surrounded with a non-conducting envelope, the instrument would retain the temperature impressed upon it below, even though raised quite gradually to the surface. Of course, after letting it down to any particular depth, it should be suffered to remain in that position for a long time, in order to acquire the precise temperature of the surrounding water. It should then be drawn up as rapidly as convenient, and its temperature noted without delay. To avoid the necessity of opening the cylinders at each observation, for the purpose of observing the instrument, a part of the stem or scale might be allowed to project through one end, taking care that the perforation in the cylinder through which they pass is perfectly secured by cement against the admission of water. This arrangement, however, is by no means necessary, and would be difficult to make secure.

To those who are provided with a *Maximum Thermometer* these precautions would be unnecessary, for it is the property of that instrument to indicate by its gage or float, the *highest* temperature to which it has been exposed in observation, although the mercury in the stem may subsequently have been much depressed. With an instrument of this description, observations would be more accurate, and at the same time much more readily made than by any other arrangement that could be devised, and it would therefore be desirable that those who are about to enter upon experiments of this nature would provide a Maximum Thermometer for the purpose. The instrument can be procured in any of the large cities at a moderate cost, probably not exceeding five dollars.

A close approximation to the temperature might, I think, be obtained by enveloping the bulb in a thick covering of cement formed of melted rosin and bees wax, which, when cold, would form a hard covering, impervious to water, and having but little power to conduct heat. This method, I think, is well worthy of being tried.

Where there are several wells of different depths near each other, the *rate of increase* might be ascertained to a certain extent, by placing the thermometer successively at the bottom of each well—but the results would be more satisfactory and complete if *progressive* experiments were

made in each. Moreover, such experiments should be repeated several times, and the mean of observations taken.

9. In what way or according to what law does the strength of the water in salt wells vary with the depth?

This query which is addressed especially to the proprietors of our western salt works, has been in part suggested by a very curious fact mentioned by Alberti in a work published a few years ago on the rocks of Wirtembury. This author states that the brine *diminishes* in strength from the surface downwards to a certain depth, where it is almost in the condition of *pure water*, and that beneath this it grows stronger as you descend. The fact is extraordinary and almost incredible—yet it is asserted upon the authority of a great number of carefully executed observations.

The following table selected from a number of similar ones, will serve as an example of the seemingly inverted arrangement of the water in the upper part of the well, and of the regularly increasing strength beneath. The series of observations were made after the well had remained eight hours without being drawn upon. The unit of measurement referred to in the table is equivalent to three and a half English feet. I have not reduced the numbers to feet, because this would have rendered fractional qualities necessary in the columns expressing the depth.

Depth below the surface.	Per centage of salt.
16 measures	2½
17 do.	2½
18 do.	2
19 do.	1½
20 do.	1
21 do.	¾
22 do.	¾
29 do.	¾
47 do.	0
48 do.	0
49 do.	¼
54 do.	¼
55 do.	¼
58 do.	¼
91 do.	1
92 do.	3
93 do.	7½
94 do.	13
95 do.	19
96 do.	22
97 do.	23
98 do.	26
99 do.	27

In another series of observations upon the same well in different circumstances, the maximum strength of the brine, instead of occurring as in the above experiments at 47 or 48 measures below the surface, took place at the depth of 140 measures. The subsequent increase of saline impregnation was also a great deal slower, so that to reach brine of 27 per cent., it was necessary to descend to a distance of 197 measures.

The facts here stated possess the highest practical, as well as philosophical interest; but further experiments are wanting to determine whether in the numerous observations referred to by Alberti, the very singular results which he has recorded were produced by some general cause, or by peculiar circumstances of a local character. To

settle this important point, observations made in our western salt wells would be of the highest value. If a similar gradation in the strength of the brine should be found in them, a very striking proof would be furnished of the existence of some general law on the subject, with which the world has been hitherto unacquainted. It is hoped that such of your readers as are interested in the salt works of our Western Country, will at once recognise the importance of the inquiry, and will hereafter contribute to your pages the results of their observations on the subject.

WM. B. ROGERS.

[Before receiving the foregoing article, we had, with views to other objects, addressed some other queries on kindred subjects to a few friends residing in or near the "rotten limestone" region of Southern Alabama, which is supplied with pure water almost exclusively by deep Artesian Wells. They will here be stated concisely—and we add our request to that of Professor Rogers, that any of our readers who have it in their power, will obtain and communicate correct information on any one, or more, of the points on which it is desired.

Do many of the Artesian Wells in Southern Alabama reach water that rises to and flows over the surface, forming artificial, but permanent fountains? In such cases, with what force does the water burst out, through bores of specified diameters? What is the usual expense of the boring, according to the size of the auger used, and the depth reached? Is overflowing water reached on the elevated prairie lands, as certainly as on lower ground, and with what difference of depth, and of expense?

The main object (visionary as it may be) of these latter inquiries was to learn whether the remarkable and abundant supply of deep subterraneous waters in this region might not be used to provide for two of the greatest wants of its inhabitants, viz: water power to propel machinery, and streams for irrigation. The bald prairies, which are rendered barren by the excess of their calcareous ingredient, would be kept fertile by watering, and the whole of that prairie region may be greatly increased in value by the same aid, if it can be cheaply given. If we may rely on our few examinations already made of these prairie soils, they are calcareous in a very high degree—which quality serves to give present fertility, and may also cause future sterility, if not guarded against by some care. As to water power from an overflowing well—however feeble it may be through a small bore, where its passage is much obstructed, its force will be increased far more than merely in proportion to the increased size of the bore—and if the supply of water below is unlimited, so may be the water power thus obtained.

Readers who reside near any of the great and well known bodies of prairie land in the western states, will also aid us in these and other objects of inquiry by sending samples of soil from any of these prairies, of well known and remarkable qualities, whether fertile or otherwise. The land should be dry, (or not too wet for cultivation without draining,) and its character in all other respects be particularly stated in ex-

planatory references to the samples of soil—such as the shape and exposure of the surface—degree of fertility—whether subject at any time to inundation from rivers—the names (whether common or botanical, or both) of the kinds of grasses which form the principal growth of the soils, &c. &c. Any such specimen may be sent to the editor by mail, and free of postage if the whole, with its envelope, does not exceed half an ounce in weight. When thus transmitted, the soil should be enclosed in a small bag of thin but strong paper, with the edges closed by paste.]

COMPARATIVE VIEW OF THE RIGHTS OF CITIZENS, AND OF HOGS, UNDER THE FENCE LAW OF VIRGINIA.

To the Editor of the Farmers' Register.

Fairfax County, Nov. 20, 1834.

I rejoice to have your able and industrious support in relation to that most odious law prescribing and defining what shall be a legal fence—or in practical plain common sense, what a man shall do before he can exclude others, and be authorized to say that the fruits of his land and labor are in a legal view his own. Yet, sir, strange and ludicrous as it is, though I can by law exclude my fellow man and fellow citizen, from "ranging" or passing over my land, under heavy penalties, and even send him to jail if he disregards the prohibition, I dare not, without incurring heavy penalties, exercise the rights and privileges of an owner towards horses, cattle, and hogs. They, like the king, or other great men, "can do no wrong." Is it not passing strange that the beasts of the field should have rights and privileges denied to man? I ask, sir, if it be not passing strange that the governor of Virginia has not the rights of a horse, a cow, or a hog? I pray you not to misunderstand me—I am serious: and I appeal to your statute book, and say that the governor dare not "range" my grounds, and yet his beasts can, and if I resist, and they are injured, wo be unto me in damages. As much as I respect the sanctifications of time, I blush to think that such a law has existence, and that it is thus saved from public scorn. It is absolute mockery to talk of a civilized society where the rights of person and property are not fully and perfectly protected by the law; and in perfect respect to the General Assembly, I must say that to give one the right of enjoying the property of another looks like outrageous injustice, and downright plunder.

JEREMIAH.

From the Philadelphia Inquirer.

RAIL ROAD RAPIDITY.

We stated on Friday that the Camden Company had actually run the whole distance from New York to Philadelphia in less than five hours—being at the rate of thirty miles an hour for that part of the route which is between South Amboy and Camden.

This is undoubtedly one of the most striking facts connected with the progress and growth of rail road travelling which has yet taken place in this section of the country. It shows what can be accomplished by science rightly applied. For while it is well known that several natural disadvantages impair the speed of the Camden and

Amboy rail road machinery—besides part of the distance—that between New York and South Amboy—being water carriage, and therefore slow in proportion, yet we see the two large cities of New York and Philadelphia now for the first time, brought within five hours of each other.

The whole distance by this route is ninety-four miles, being about ten miles longer than the route by the way of Trenton.

The Camden and Amboy Company has done well, and deserves the liberal patronage of the community. Judging also from what it has accomplished, we may be permitted to imagine what greater speed may be attained, on the opening of the Trenton route, which is only eighty-four miles long, and passes through the intermediate country without the curvatures, deep cuts, elevations or water sections, which necessarily impede the speed of the Camden and Amboy route. At the same rate of speed, the journey to New York by the Trenton route, may be travelled in about two hours and three quarters, but as the levels and directness are greater, it may be calculated on extraordinary occasions, at two hours and ten minutes.

This calculation may appear incredible to the public; but it will be found on a strict scrutiny to be based on mathematical accuracy. Ten years ago who would have supposed that in 1834, the distance between New York and this city would have been diminished to five hours? Yet so it was on Thursday.

We trust that with these facts before our public men, no impediments will be allowed to prevent the opening of all routes—but particularly the shortest, and most direct, between our large commercial cities. The growing population and intercourse of New York and Philadelphia will soon demand another route of communication. One will be insufficient for the purposes of trade and commerce, and we trust that no time will be lost in providing for the construction of the Trenton route especially. The opening of the new route will not in the slightest degree affect the interests, injure the prospects, or depreciate the stock, of the Camden and Amboy Company. It will only increase the number of travellers. The Camden and Amboy Company deserve well of the public—their arrangements are on the most liberal scale—their steam boats, rail road cars and so forth, of the most commodious character. They cannot be put down—there is no desire to injure a corporation that has conferred such important advantages upon the public; but at the same time, for the sake of fair competition and honest rivalry and general convenience, we earnestly trust that the New Jersey Legislature will act in a liberal and enlightened spirit, and sanction both routes.

From the Genesee Farmer.

ON ROLLING WHEAT.

Some farmers in this neighborhood, have given the finish to putting in their wheat by rolling the fields smooth; but my experience is opposed to this practice. For mowing indeed, the ground cannot be too smooth; and wheat that is well matted above and well rooted below, will doubtless be less affected; but late sown wheat that comes up through a smooth uniform surface, is much more exposed and injured by the sweeping

winds than wheat that grows on ground left rough by the tracks of the harrow. The difference is very great; and if there should be any of your readers who doubt it, let them run the harrow in a few places across the rolled field, and observe the result next spring.

The best time for rolling wheat and preparing the ground for the scythe is in the spring.

A PLOUGHMAN.

BRITISH ASSOCIATION.

In the proceedings of the British Association at their recent meeting, (as reported in the *Literary Gazette*), there is a complimentary notice of one of our young countrymen, Professor Henry D. Rogers of Philadelphia, who received his education at William and Mary College. The subject of the notice was a report on the geology of North America, which he (as a member of their Geological Committee) had been formerly required to prepare, and which was laid before this meeting. The British Association is composed of a numerous body of the most distinguished scientific and literary men, residents of every part of the civilized world—and this mode of combining their efforts for the advancement of science cannot fail to be attended by the best effects.

TO CORRESPONDENTS AND SUBSCRIBERS.

The following communications have been received: *On the injury to corn caused by gathering its fodder—General topics connected with agriculture, &c.—Address to the Agricultural Society of King William and King and Queen—Performance of a thrashing machine and wheat fan—On obtaining new and improved varieties of grain by crossing—On the rotation of crops, and the Pamunky plan of cultivating corn—Memoir on making the wine of Marsillac (translation from the French)—Short rules for tobacco planters—Some account of the travertine formation of the Sweet Spring Valley, by Prof. W. B. Rogers—On wine culture in the United States—Desultory remarks on the fermentation of putrescent manures—Querist—Address to the Agricultural Society of Fredericksburg—Queries on herds grass.*

Most of the many errors which may have been observed in the long and interesting article on *Cotton*, in No. 6, were in the print from which it was republished. We are often placed in the like situation, and should not have made a remark on this occasion, but that the faults had been attributed by a friend (and very rationally) to our press. All publishers are more or less liable to charges of this kind, and we have doubtless enough such offences of our own to answer for, to be solicitous that those of others should not be added to the burden. We do not feel at liberty to alter the language of printed articles, for even gross and manifest errors, unless the proper form is equally evident. This is not the only occurrence which has required such explanatory remarks—and many others hereafter may render it desirable that our readers should remember the excuses now offered.

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THE FARMERS' REGISTER.

Vol. II.

JANUARY, 1835.

No. 8.

EDMUND RUFFIN, EDITOR AND PROPRIETOR.

Extracts from the last edition (1833) of the "Complete Grazier."

ON THE BREEDING, REARING, FATTENING, AND GENERAL MANAGEMENT OF NEAT CAT- TLE.

[Concluded from page 398 Vol. II.]

Artificial food for neat cattle.

Having thus stated the various vegetable productions which have been beneficially employed in feeding and fattening neat cattle, we proceed to detail a few hints respecting other articles which are, or may be, likewise employed with advantage. For this purpose, *linseed-oil cakes* have long been celebrated as eminently useful; they are asserted to have a very extraordinary effect on cows before calving, causing their milk to spring more copiously, and preparing the animals for the crucial period of calving. But, as the price of the cake has of late years greatly increased, it has been recommended to substitute *linseed jelly*, as being infinitely superior; and when mixed with a due proportion of hay or meal, affording an excellent composition for stall-feeding and fattening. It is prepared in the following manner:—

To seven parts of water let one part of linseed be put, for forty-eight hours; then boil it slowly for two hours, gently stirring the whole lest it should burn. Afterwards cool it in tubs, and mix it with meal, bran, or cut chaff, in the proportion of one bushel of hay to the jelly produced by one quart of linseed, well mashed together.

This quantity given daily, with other food, will forward cattle rapidly; but it must be increased when they are intended to be completely fattened.

In America, experiments have been tried with *linseed oil* mixed with the meal of Indian corn. The stall-fed steer, to which the composition was given, was observed to *thrive rapidly, and to sweat most profusely*; but through inattention, too large a proportion of oil was given at one time with the food, which disgusted the beast, and occasioned the experiment to be discontinued. It has also been tried in this country, in the proportion of one quart to three bushels of hay cut into chaff and left to heat: hay has likewise been sprinkled with it, in the mow, and its fattening quality has been thus in both instances much improved. It has also been mixed with wheat bran; but the experiment did not answer; and, unless given in extremely moderate quantities, it probably would be found to be too stimulating in its effects. There can, however, be no doubt, but that linseed or flax-seed jelly is more agreeable to cattle than cake, while it renders them less liable to surfeit in case an extra quantity should be accidentally given, and is less liable to affect the meat with peculiar taste than either oil or cake, and consequently it merits a trial. It has been recommended to change this food about a month before the beast is killed, to prevent, if possible, the flesh from retaining the flavor of the oil cake, or jelly; but the established principle of feeding requires that the food of the most fattening quality should be given last, and it would be difficult to substitute any of a more nutritive nature than this: corn, or bean-meal, indeed, might

answer the purpose, but the cost will generally be found an objection.

Cattle, fed on sour food, prepared by *fermenting rye-flour and water* into a kind of paste, and then diluted with water, and thickened with hay cut small, are also said to fatten quickly. This practice chiefly prevails in France, whence it was introduced into this country. Concerning the efficacy of acid food in fattening animals, there is much difference of opinion. It is well known, that hogs derive more benefit from sour milk and swill than when those articles are in a fresh state; and it is highly probable, that sour articles may contribute to promote digestion, and by facilitating the consumption of a large quantity of food in a stated period, consequently expedite the fattening of cattle. *Brewer's grains* are sometimes used in that state; but *distiller's grains* differ from them in having a proportion of rye frequently mixed with the malt, which renders them more naturally sour. But such acid messes can only, we conceive, be considered as preparatory to the more forcing and essential articles of dry food: without which it is scarcely possible that any steer, or bullock, can acquire that firmness of muscle and fat which is so deservedly admired, and considered as the criterion of excellence.

The *wash*, or refuse of malt, remaining after distillation, which was formerly applied exclusively to the feeding of swine, has of late years been applied with success to the stall-feeding of cattle. It is conveyed from the distillery in large carts, closely covered, and well jointed, in order to prevent leaking. The liquor is then discharged into vats, or other vessels, and when these are about two-thirds filled, a quantity of sweet hay, previously cut small, is immersed for two or three days, that the wash may imbibe the flavor of the hay before it is used. In this state it is carried to the stalls, and poured into troughs, whence it is in general eagerly eaten by cattle. Sometimes, however, the beasts are at first averse to this mixture, in which case it has been recommended frequently to sprinkle their hay with the wash; thus, having the smell continually before them, and seeing other animals eating the same composition with avidity, they not only gradually become accustomed to it, but at length greatly relish it, and are said to fatten speedily.

One of the most successful instances of this mode of fattening cattle, which has occurred within our observation, is that of Messrs. Hodgson and Co. the proprietors of Bolingbroke-house distillery, Battersea, near London.* Between October and April, which is their regular working season in the distillery, they fatten as near as may be 600; having generally about 350 in the house tied up at one time, and about 100 in an adjoining orchard which are afterwards taken in, to replace such as are sold off. They have no stated period for fattening these bullocks, being regulated entirely by the state of the markets; but from ten to sixteen weeks is about the usual time, and the cattle are found to gain, upon an average, the very unusual quantity of from three to four stone per week.

*Malcolm's Compendium, Vol. I. p. 355.

Their food is wash, grains, and hay, sometimes meadow, at others clover, and occasionally relieved by oat or barley straw, which is sometimes, though not regularly, cut into chaff: hay or straw is given to them twice a day, in order that they may ruminate, and as much grains and wash as they can eat. In general, they come readily to this kind of food, though some are four or five days before they lose their aversion to it.

The stock fattened at the distillery above named, consists of cattle of every sort and size. There are many Scotch cattle, or kyloes, as well as those reared in Northumberland, Wales, and Herefordshire, but none of the Sussex or Devonshire breeds, which Messrs. H. and Co. say are too dear for them. According to their quality, the cattle are supposed to pay from *five to twenty shillings* per week.

Other trials have been made, with different results. Messrs. Smith and Harrington, of Brentford, fattened 810 oxen on the refuse of 25,750 quarters of barley: they were in tolerable condition when taken in, and averaged about 110 stone. In twenty weeks they acquired of flesh at the rate of about 35 stone each; from which, 5 stone is to be deducted, as the value consumed by them in hay; leaving 30 stone as the produce of the distillery: thus 810 beasts produced 24,300 stone of beef, or about one stone for the grains from a quarter of barley, which, assuming beef to be worth four shillings the stone, of 8lbs., is sixpence per bushel, or about double the usual price of grains.

The same gentlemen, however, have fatted 250 bullocks on the refuse wash of a sugar distillery: they were kept four months, and increased in value £8 each: hay was £4 to £4 10s. per load, and they were allowed 30 to 40 quarters of brewers' grains daily; but the quantity of hay consumed was so great, that money was lost by the experiment, though the wash was only valued at 20s. each.

With equal success has *molasses*, or *treacle*, been employed; though the expense incurred by the use of this article will probably prevent its general adoption in this country. It has been used in the West Indies, in combination with farinaceous substances, and, when these could not be procured, with cane-tops, oil-cake, and other articles of dry food, together with a little hay, or not too green fodder, and has been found greatly to expedite the fattening of cattle in general, and of old and decayed oxen in particular, when given in the proportion of half a pint to a pint of molasses, twice in the day, to animals which had been exhausted by continual and severe labor for a long series of years. In adopting this article, a gallon of oats, or other damaged grain, roughly ground, or the same quantity of potatoes, should be boiled in a sufficient proportion of water to form a thick mash. It must be well stirred while on the fire, to prevent it from burning, or sticking to the sides of the vessel; and when it becomes cool the mixture is to be formed into balls of about one pound weight each. These balls are divided into two equal portions, which, being previously immersed in the treacle, are given to the beasts in the morning and evening: they will devour them with eagerness, and will speedily thrive and fatten by the addition of a little hay, or any green fodder that is not too succulent. One or two spoonful of salt may also be dissolved in the composition, which

will contribute to preserve the health of the animals; and, in case corn cannot be conveniently procured and ground, pulverized oil-cake, diluted in water, and seasoned with a small quantity of salt, with the same proportion of molasses, may be advantageously substituted.* Molasses is also commonly given to cattle in the West Indies, in their water, and is found to have an evident effect on their condition: horses, in particular, are improved much in their coat; and it is there a general remark that, at crop-time, when the negroes indulge largely in the use of cane-juice, they improve in health and appearance, although their labor is then more severe than at any other period of the year.

In the preceding facts and statements we have referred chiefly to the feeding and fattening of middle-aged and old cattle; *young stock*, however, require particular attention, lest their growth be impeded, and therefore should be fed on the best and most nutritive food the farm can supply. Hence, during the winter, they should have hay, turnips, carrots, potatoes, or other roots: or if straw be substituted for hay, the proportion of roots should be increased and given with attention. In summer their food varies so little from that already specified, as to require no particular details on this head.

With regard to oxen used in draught, it should be observed, that they ought to be well-fed, while they are kept in constant employ, particularly in the commencement of spring and in autumn, when their labor is most wanted. During those seasons, they should be supplied with abundance of cut hay and straw, with an allowance of a bushel or two of steamed potatoes, turnips, cabbages, or carrots, per day, in proportion to the work, and to the quality of the fodder as well as of the roots; and, if the labor be unusually severe a moderate quantity of oats, with bran, or some bean, or pea-meal, should be allowed. In summer, the beasts may be soiled with green food, and in the winter stall-fed, in the manner and with the articles above mentioned. Some farmers, indeed, endeavor to support working oxen on straw alone, and the possibility of this is one great argument used in favor of their employment; but it will be generally found to injure them in a greater proportion than the saving in food.

A most important object in the feeding or fattening of cattle is, that such arrangements should be made, and such a supply of food be provided for winter consumption, that the grazier may be enabled to keep them throughout that trying season, and sell them when meat fetches the highest prices, viz. from the beginning of February to the close of May. By this procedure, he will not only obtain more for the sale of them than the autumnal markets would produce, but his stock will go off freely, and every market be in his favor. He will further obtain the largest possible command of manure, and consequently be enabled to conduct his business to the most profit.

The *relative proportion of food* consumed by fattening beasts necessarily varies, according to the size of the animals, and the nutriment afforded by the respective vegetables. It has, however, been

*For a series of experiments on sugar, as food for sheep, see Book IV. Chap. VI.

found, that an ox will eat something less than one fifth *per diem*, of his own weight of cabbages. Fattening beasts require about eighteen stone of common turnips daily, besides an adequate allowance of dry meat to counteract the superabundant moisture of these roots. An acre of twenty-five tons, therefore, will fatten a beast of sixty stone, or something more. For middle-sized animals a bushel or a bushel and a half, of distillers' or brewers' grains will be sufficient, if combined with an ample portion of cut hay, chaff, or bean straw, given between the intervals of allotting the grains. Bullocks varying from forty-five to sixty stone, consume about eight or ten stone of carrots or parsnips *per diem*, beside an additional quantity of dry provender; that is in the proportion of one-sixth part of their own weight; and, as a good acre of carrots will yield 400 bushels, or 22,400 lbs. it would support such an ox 160 days, a period sufficiently long for beasts to be kept that have had the summer's grass. If they are half fat when put to carrots, an acre would probably be sufficient to fatten two such beasts. Of potatoes, small cattle (such as those of Wales and Scotland) eat every day about one bushel per head, in a raw state, with an allowance of one truss of hay divided between four beasts. To an animal of eighty or one hundred stone, eight to ten pounds of pulverized oil-cake are given each day, with half a stone, or one stone of cut hay, in addition, every day, for seven or eight weeks, which allotment of cake is then usually increased to twelve or fifteen pounds, until the animal is sufficiently fat for sale.*

Although as we have just seen, animals have been not uncommonly supposed to consume a quantity of food in proportion to their weight, yet this is purely theoretical; for, in fact, various experiments have proved that though small cattle may be supported on pastures that will not carry heavy beasts, and also on more indifferent soiling food, yet, when put up to fatten, the difference is of no account in proportion to their weight: though cattle of the same weight and breed will sometimes consume different quantities. In proof of this, it may be observed that the London cowkeepers, who have large numbers of different size, supply an equal quantity to each.

But whatever articles of food may be given, they ought to be apportioned with as much regard to *regularity of time and quantity* as is practicable; and if any small part be at any time left unconsumed, it should be removed before the next feed is given, otherwise the beast will loath it.

In stall-feeding, it is too common a practice to give a certain allowance, every day, without regard to any circumstance, but it is a fact, that a fattening beast will eat with a keener appetite on a cold day than in warm, damp weather; hence his food ought to be proportioned accordingly. By giving the same quantity every day, the animal may be cloyed; thus his appetite becomes impaired, the food is wasted, and several days will necessarily elapse before he can recover it. Hence, at least three periods of the day, as nearly equidistant as possible, should be selected, when such an allowance should be given to each animal as he can eat with a good appetite; which point can

be regulated best by attending duly to the state of the weather, or season, and the progress he makes in flesh, for as he fattens, his appetite will become more delicate, and he will require more frequent feeding, in smaller quantities; thus the beast will improve progressively and uniformly, while a trifling loss of food only can occur by such method. In proportion to the nutritive matter contained in the food, the animal will generally be found to advance;* and in order that this important branch of rural economy may be properly conducted, the young grazier will find it serviceable to weigh each beast once a fortnight, at the least, before he gives the morning allowance, by which he will be enabled to form an accurate estimate of the real progress his cattle make in thriving. If they do not continue to advance, according to the result of former weighings, it will be necessary to change their food; and as bullocks will take less meat every week after their kidneys are covered with fat, it will be even well to weigh them once a week, as a more adequate idea of their thriving may thus be formed: thus, supposing an ox to consume food to the value of 9d. per day, or 5s. 3d. per week, and that the price of beef at markets is 4s. 6d. per stone of eight pounds, the return he makes for his keep may be readily calculated.

Of equal, if not superior, importance with regularity in feeding is *cleanliness*, a regard to which is admitted, by all intelligent breeders, to be one of the most essential requisites to the prosperity of cattle. Hence not only ought they to be supplied with abundance of pure water, but also, whenever they are brought into the stalls, either from pasture or from work, their feet ought to be washed, lest any filth should remain there and soften their hoofs. Frequent washing after hard labor, or at least once in the week, should be performed; and, though the practice of currying and combing, or of friction with brushes, cannot perhaps be adopted where the beasts are numerous, yet, we conceive, they might be often rubbed with a wisp of straw to considerable advantage. The mangers and stalls should likewise be kept as clean as possible; and the former, if they cannot often be washed, should be cleared every morning from dust and filth, which may be easily effected by means of a common, blunt-pointed bricklayer's trowel: they otherwise acquire a sour and offensive smell from the decay of vegetable matter left in them, which nauseates the cattle, and prevents their feeding. After the stalls have been cleansed by constantly removing the dung and sweeping the pavement, a sufficient quantity of fresh litter ought to be strewed over, which will invite them to lie down; for nothing contributes more to expedite the fattening of cattle than moderate warmth, ease and repose. In fact, where *straw* can be obtained at a moderate price, supposing the farm does not yield an adequate supply for this purpose, the stalls and farmyards ought always to be well littered, especially during the winter season.

The quantity of manure thus made is an essential object; for it has been found that forty-five oxen, littered, while fattening, with twenty wagonloads of stubble, have made *two hundred loads*, each *three tons*, the greatest and most valuable portion of which would have been lost, had it not been mixed with, and absorbed by, the straw.

*See the quantities consumed by different cattle, Chap. II., and Appendix No. I.

*See Book IX. Chap. VI.

Every load of hay and litter, given to beasts fattening on oil-cake, yield at least ten tons of dung; and, on comparing the dung obtained by feeding with oil-cake with that of the common farm-yard, it has been found, that the effects produced by spreading *twelve* loads of the former on an acre, considerably exceeded those of *twenty-four* loads of the latter manure. It is, in fact, invariably found that the value of the manure is in proportion to the nutriment contained in the aliment. By another trial it appears, that thirty-six cows and four horses, when tied up, ate *fifty tons* of hay, and had *twenty acres** of straw for litter; they made *two hundred loads of dung*, in rotten order for the land:—a difference in weight which is accounted for by the absorption of moisture by straw.

Of the sale of neat cattle.

Having now stated the leading facts and experiments that have been made on the subject of feeding and fattening neat cattle, we shall conclude the subject with a few remarks on the *sale* of beasts, when properly fattened for that purpose. In order to ascertain this point, the following hints may, perhaps, afford some criterion. First, when the general appearance of the animal shows high condition, and each bone is covered with flesh in the manner required to constitute a perfect shape, it may be concluded that the beast is well fed; especially when his hip-bones, or, as they are sometimes termed, his *huckle-bones*, are round, his ribs smooth and not sharp, his flanks full, and cod round. When these marks are perceptible, the beast may be handled, and his lowermost ribs felt; if the skin be kindly or mellow, that is, soft yet firm to the touch, it is certain that he is well fed outwardly, or in other words, upon the bones. Next, the hand may be laid upon his huckle-bones, and if they likewise feel soft, round, and plump, it may be safely concluded that the animal is well fed, both externally and internally; that is, both in flesh and tallow. He may then be handled at the setting on of his tail, which, if it be thick, full, and soft to the touch, is also an indication that the beast is well fed externally; the same circumstance is likewise evinced by the *nach-bones*, which lie on either side of the setting on of his tail, feeling mellow, or soft and loose. Lastly, the cod may be examined, if an ox, or the navel of a cow, and if they respectively feel thick, round, large, and plump, it is a certain criterion that the beast is well tallowed within; and, when any of these parts or members handle contrary to the rules above mentioned, a contrary judgement must be formed.

But, after all the attention and labor which the grazier may bestow, his hopes are liable to be frustrated, in some measure at least, unless he select a proper time for the disposing of his fat cattle. The most common season for beef is from Michaelmas to Christmas; but the markets are then more abundantly and more cheaply supplied than at any other period, because cattle which have been fattened on luxuriant pasture grounds, are then ready for sale, and many farmers are under the necessity

of raising money to meet the demands of the close of the year. Hence the attentive grazier, who has sufficient capital to hold over his stock, will find it most beneficial, at this time, to dispose only of such part of it as, being then thoroughly fat, consequently would not pay for any longer keeping; and the increase of prices, in the spring, will generally be found to repay him. Beasts are chiefly driven to London for sale; and, where the distance from the metropolis is very considerable, they are liable to many accidents on the road, besides their diminution in point of weight, which, even under the eye of the most attentive drivers, are often unavoidably incurred; while the fluctuation of the markets renders his risk very considerable. It will, therefore, be advisable, where it can be conveniently or advantageously effected, to dispose of fat stock in such markets as are in the vicinity of, or at an easy distance from the farm.

In drawing off lots of cattle for sale, it is the general practice to dispose of the fattest animals, and to keep those which do not fatten kindly for additional exertions. Such procedure may, indeed, be admitted to a certain extent, if the food provided be not expensive; but, if the beasts are reserved for corn or cake-feeding, or if the supply of other food is precarious or limited, it is highly questionable. As soon as a grazier is fully convinced that he has a beast which is not kindly disposed to take on fat, or is an *ill-doer*, the *first loss* is obviously the best, and he should dispose of the unthrifty animal the earliest opportunity.

In the country, a common mode of selling cattle for slaughter is by *lots*; and, in this case, to prevent dispute between the parties, care should be taken to fix the precise time in which any particular lot is to be drawn, in order that no unnecessary food may be consumed. Formerly it was, and even now, in some places, it is usual to sell by the *eye*, a method which is certainly unequal as it respects both the farmer and the butcher; for the former unless he has been accustomed to weigh his beasts during the progressive stages of their fattening, can form at best but an uncertain idea of their weight; while the latter, from his continual practice, is enabled to form a tolerably accurate estimate. Hence some have killed a beast out of a particular lot, with a view to ascertain the average weight of animals in such lot; but, in order to induce a perfect equality between the buyer and seller, it would be better to dispose of every beast by weight, which can be easily ascertained by the steel-yard, and this mode is now coming into use.

It is not, however, sufficient to ascertain the weight of a living fatted beast, or bullock. Different parts of the same animal are different in their value: and there is a rule for ascertaining the proportion of these various parts, by which their weight may be known with almost equal certainty as the weight of the whole beast. It is, however, necessary to premise, that the following proportions are calculated chiefly for Scotch cattle; but, as great numbers of these are fattened in England, we trust the annexed hints will be found useful.

The four quarters constitute half the weight of the bullock; the skin is the eighteenth part; the tallow the twelfth part; making twenty-three thirty-sixths, or about two-thirds of the whole; the remaining third part, or a little more, is composed

*This is an inaccurate mode of stating the quantity; but it may be assumed at about half the weight of the hay, or twenty-five tons.

of the head, feet, tripe, blood, &c. which offals never sell by weight, but as a certain proportion of the weight of the beast. They commonly produce from 15s. to 20s. according to the price of meat, supposing the bullock to weigh about 100 stone of fourteen lbs. live weight. These particulars being adjusted, the next point which the seller is to ascertain is the market-price of butcher's meat, tallow, and hides. Supposing the bullock to be sold is seventy-two stone living weight,* the four quarters make thirty-six stone, which, at 8s.† per stone, amount to £14 8s. The hide may be worth 36s.; and the tallow, being 8s. 4d. the stone of 14lbs., is worth £2 10s. sterling. The offals, according to the proportion above stated, will give 15s.; and, by that computation, the value of the bullock is £19 9s.; which answers to nearly 5s. 6d. per stone, *live-weight*. And therefore, if a butcher agree to give that sum per stone, no more is necessary to ascertain the price of the whole carcass than to weigh the beast.†

With regard to *fut calves*, we should observe that, in general by weighing the animal alive at the time of sale, and from the gross weight deducting eight pounds from every score, to be al-

lowed to the butcher, the remainder will prove to be the weight of the four quarters. Thus, if a farmer has occasion to ascertain the value of a calf at 8d. per pound: properly securing him so as not to hurt the beast, he weighs him with scales or steel-yard, or in a weighing-machine, and finds the weight to be ten score, or 200 lbs. From this weight let eighty pounds, or eight pounds from each score, be deducted; the remainder will be 120 lbs. the weight of the four quarters very nearly; which at 8d. per pound, will be £4 and so of any other weight or price. As this rule will not, in general, vary more than four ounces, or half a pound in a quarter or side, it will be found to answer sufficiently well for the purpose.

Such are the rules by which the live-weight of cattle is commonly estimated; but, that they are not always to be relied on, will be sufficiently exemplified by the following *statement of the live and dead weights, and proportion of offal*, of six oxen of different breeds. They have been selected without regard to a comparison between the breeds; but, being all prime cattle, the account may also afford some data for a judgement on that subject.

	Devon.		Durham.‖	
	st.	lb.	st.	lb.
Live weight	114	0	137	12
	st.	lb.	st.	lb.
Head and pluck	5	2	7	7
Blood, entrails, and feet, ...	13	3	14	11
Coarse offal	18	5	22	4
Tallow	10	6	11	7
Hide	6	3	8	0
	35	0	41	11
Weight of carcass	st. 79	0	st. 96	1

	Hereford.		Hereford.§	
	st.	lb.	st.	lb.
Live Weight	95	10	120	3
	st.	lb.	st.	lb.
Head and pluck	7	3	9	4
Blood, entrails, and feet, ...	10	9	32	0
Coarse offal	17	12	41	4
Tallow	12	6	13	2
Hide	8	8	9	2
	38	12	63	8
Weight of carcass	st. 56	12	st. 56	9

*As the weight of beasts varies accordingly as their bellies are more or less full, it is necessary to state, that the proportions above stated were made out when the cattle were weighed at eleven o'clock in the forenoon.

†Where prices are mentioned, they are, of course, only nominal.

‖This ox obtained a prize from the Durham Agricultural Society, in 1806.—See *Agricultural Survey of Durham*, pp. 238 and 245.

§This ox obtained the highest prize from the Smithfield Cattle Club, in 1807; but in taking his dead-weight, the contents of his stomach were not deducted. No fair comparison can, therefore, be drawn between him and

‡Kaimes' Gentleman Farmer, p. 209. For ascertaining the weight of cattle, we know of few more useful manuals than Renton's "Grazier's Ready Reckoner," a small pamphlet consisting of tables calculated to determine, by the admeasurement of a beast's body, the weight of any animal within certain limits, sinking the oil; and accompanied with rules for taking such measurement.

	<i>Cross-French and Devon.</i>		*	<i>Highland.</i>	
	st.	lb.		st.	lb.
Live weight	77	12		46	8
	st.	lb.		st.	lb.
Head and pluck	4	7		3	3
Blood, entrails, and feet,	10	10		7	10
Coarse offal	15	3		10	13
Tallow	13	12		5	10
Hide	6	2		4	9
	35	3		21	4
Weight of carcass	st. 42	9		st. 25	4

Summary.

	st.	lb.		st.	lb.	
Proportion of Carcass to 10 Stones of Live-Weight.	6	13	Devon	2	4½	Proportion of Coarse offal to 10 Stones of Carcass.
	6	13½	Durham	2	1½	
	5	12½	Hereford	3	2	
	4	10	Ditto	7	2½	
	4	7½	Cross	4	4½	
	5	6	Highland	4	4½	

The two following tables, selected from Lord Oxen, &c." exhibit the various weights adopted in different counties and districts for equalizing the Observations relative to Sheep, Wool, Ploughs,

Table for the equalization of different weights.

Scores.	Stones at 14lb.	Stones at 8lb.	Scotch Stones 16lb.	Hundreds, 112lbs.
	st. lb.	st. lb.	st. lb.	cwt. qrs. lb.
20 equal	28 8	50 0	25 0	3 2 8
25 "	35 10	62 4	31 2	4 1 24
30 "	42 12	75 0	37 4	5 1 12
35 "	50 0	87 4	43 6	6 1 0
40 "	57 2	100 0	50 0	7 0 16
45 "	64 4	112 4	56 2	8 0 4
50 "	71 6	125 0	62 4	8 8 20
55 "	78 8	137 4	68 6	9 3 8
60 "	85 10	150 0	75 0	10 2 24
65 "	92 12	162 4	81 2	11 2 12
70 "	100 0	175 0	87 4	12 2 0
75 "	107 2	187 4	93 6	13 1 16
80 "	114 4	200 0	100 0	14 1 4

The weights, *per stone*, commonly used for cattle in different parts of the kingdom, are as follow:—viz.

Smithfield	-	8 lb. of 16 oz. each.
N. Country	-	14 lb. do.
Common Scotch	-	16 lb. do.
Glasgow Tron	-	16 lb. of 22 oz.
Ayrshire	-	16 lb. of 24 do.
Dutch	-	17½ lb. of 16 do.

Of these, the stone of 14 lb. is chiefly used in calculating live-weight, and that of 8 lb. for the carcass.

the others, as they were all weighed empty; and he is only inserted among them in order to show the extraordinary difference, in real value, that might arise, if cattle were to be weighed with their stomachs full.

Allowing the true weight of the entrails of this ox to have been 13½ stone, (which nearly corresponds with the proportionate weight of his fellow Hereford,) then his proportions would have been

	st.	lb.
Dead-weight	75	5
	st.	lb.
Dead to live-weight,	6	8½
And of offal to carcass	3	0
instead of as stated in the Summary.		

*Both these oxen obtained premiums from the Smithfield Club.

Per score of 20 lbs.—the difference being calculated at one farthing per lb.

Scores at	3gd.			4d.			4jd.			4jd.			4jd.			5d.			5jd.			6d.			6jd.			6jd.			6jd.			7d.			Differ- ence.
	l.	s.	d.	l.	s.	d.	l.	s.	d.	l.	s.	d.	l.	s.	d.	l.	s.	d.	l.	s.	d.	l.	s.	d.	l.	s.	d.	l.	s.	d.	l.	s.	d.				
1	l.	8.	3.	l.	8.	8.	l.	8.	7.	l.	8.	7.	l.	8.	7.	l.	8.	7.	l.	8.	7.	l.	8.	7.	l.	8.	7.	l.	8.	7.	l.	8.	7.	l.	8.	7.	
2	0	12	6	0	13	4	0	14	2	0	15	0	0	15	10	0	16	8	0	17	6	0	18	4	0	19	2	0	20	0	21	0	22	0	23	0	
3	0	18	9	1	0	0	1	1	3	1	2	6	1	3	9	1	5	0	1	6	3	1	7	6	1	8	9	1	10	0	1	11	3	1	12	6	
4	1	5	0	1	6	8	1	8	4	1	17	0	1	11	8	1	13	4	1	15	0	1	16	8	1	18	4	2	0	2	1	8	2	16	8		
5	1	11	3	1	13	4	1	15	6	1	17	6	1	19	7	2	1	8	2	3	9	2	5	10	2	7	11	2	10	0	12	12	1	2	14	2	
20	6	5	0	6	13	4	7	1	8	7	10	0	7	18	4	8	6	8	8	15	0	9	3	4	9	11	8	10	0	10	8	4	10	16	8		
25	7	16	3	8	6	8	8	17	1	9	7	6	9	17	11	10	8	4	10	18	9	11	9	2	11	19	7	12	10	0	13	6	16	5	0		
30	9	7	6	10	0	10	12	6	11	1	9	7	6	9	17	11	10	8	4	10	18	9	11	9	2	11	19	7	12	10	0	15	12	7	18	19	
35	10	18	9	11	13	4	12	7	11	13	2	6	13	17	1	14	11	8	15	0	13	2	6	13	17	1	14	11	8	15	0	16	15	5	0		
40	12	10	0	13	6	8	14	3	4	15	0	0	15	16	8	16	13	3	17	10	0	18	6	8	19	3	4	20	0	20	16	8	21	13	4		
45	14	1	3	16	0	15	18	9	16	17	6	17	6	17	16	3	18	15	0	19	13	9	20	12	6	21	11	3	22	10	0	23	8	9	24	7	
50	15	12	6	16	13	4	17	14	2	18	15	0	19	15	10	20	18	4	24	1	3	25	4	26	18	6	22	19	2	25	0	26	18	9	27	10	
55	17	3	9	18	8	19	9	7	20	12	6	21	15	6	22	18	4	24	1	3	25	4	26	18	6	22	19	2	25	0	26	18	9	27	10		
60	18	15	0	20	0	21	5	0	22	10	0	23	15	6	25	0	26	5	0	27	10	0	28	15	0	30	0	31	5	0	32	15	0	33	17		
65	18	15	0	20	0	21	5	0	22	10	0	23	15	6	25	0	26	5	0	27	10	0	28	15	0	30	0	31	5	0	32	15	0	33	17		
70	20	6	3	21	13	4	23	0	5	24	7	6	25	14	7	27	1	8	28	15	10	31	2	11	32	10	0	33	17	1	13	5	0	10	27	1	
75	21	17	6	23	6	8	24	15	10	26	5	0	27	14	2	29	3	4	30	12	6	32	7	6	35	10	0	33	17	1	13	5	0	10	27		
80	25	0	0	26	13	4	28	6	8	30	0	0	31	13	4	33	6	8	35	0	0	36	13	4	38	6	8	40	0	41	13	4	43	6	8		
85	26	11	3	28	6	8	30	2	1	31	17	6	33	12	11	35	8	4	37	3	9	38	19	2	40	14	7	42	10	0	44	5	6	46	0		
90	28	2	6	30	0	0	31	17	6	33	15	0	35	12	6	37	10	0	39	7	6	41	5	0	43	2	6	45	0	46	17	6	48	16			
95	29	13	9	31	13	4	33	12	11	35	12	6	37	12	1	39	11	8	41	11	3	43	10	10	45	10	4	47	18	4	50	0	52	1	8		
100	31	5	0	33	6	8	35	8	4	37	10	0	39	11	8	41	13	4	43	15	0	45	16	8	47	18	4	50	0	52	1	8	54	3			

N. B. One half, $\frac{1}{2}$ 2d.
above, is

Another objection of importance, is, that the corn crop is not sufficient to employ, advantageously, all the hands necessary in preparing for seedling and securing such an undue proportion of wheat—or, in other words, the labor to be performed is overwhelmingly accumulated at one or two seasons, instead of being properly distributed throughout the year, which should be the constant aim of every farmer.

It is worthy of consideration too, that an income depending on two crops will, for obvious reasons, fluctuate less than one derived from a single crop; for I take it for granted, that this system will give little or no corn for sale, as more will be consumed and less made, than under the three-field course. So fleeting too, is the nature of money, especially in my hands, that I had rather have an income coming in at two periods of the year than all at once: with more prudent persons, however, this would be immaterial.

There is another objection that seems to me to be entitled to so much weight, as of itself almost to condemn this system, viz: that the succession of three grain crops is opposed to the universal practice and experience of all good cultivators of the soil, as well at the North, as in Great Britain. In England, it is very rare that even two white (or grain) crops follow in succession. Of a great number of rotations, I observe but one in which the practice is introduced, except in the neighborhood of towns, where manure can be obtained at will. This objection too, is strongly fortified by the acknowledged fact, that the second crop of wheat in the rotation hardly ever exceeds one-half of the product of the fallowed field per acre.

All the comparisons between this and the three-field system that I have seen, are based on the supposition that clover must be abandoned under that system, or if sown, be depastured. Cannot a standing pasture (which, by the by, is necessary on every farm where improvement is aimed at,) be combined with this system as well as any other? And if so, and if a heavy crop of clover be equal to either one or two manurings, (both of which opinions have been maintained,) I would ask, if it is not better to improve in this way one-third than one-fourth of the same farm? It can hardly be contended that the clover would be less heavy after two, than after three grain crops. If this could be satisfactorily established, I should really think that a great discovery had been made in agriculture.

It is not fair to presume, because under this system the last crop of wheat in the rotation hardly ever exceeds one-half the product of the fallowed field, that the crop of wheat after corn, as a first crop, would be equally short. My own experience is decidedly opposed to such a conclusion. I have never found such, or anything like such a difference between the product of fallowed and corn land; and the reason is obvious enough, viz: because the land had been exhausted by only one previous crop, instead of two. Still it is not to be doubted, from the success of several gentlemen who have tried it, that there are some situations peculiarly favorable to the adoption of this system, from their great natural fertility, and from the advantages they possess for grazing, without having recourse to the fields. When a part of the arable land is to be cut off for a standing pasture, I should myself greatly prefer five fields,

subjecting one field each year to the hoof; and as at least one-fifth of the farm would be required for a standing pasture, there would still be the same surface in cultivation, and the worst feature in the new system, the three successive grain crops, would be avoided. Yet a small pasture, even upon this plan, would be found to be of great advantage, particularly in wet weather.

On thin lands I know of no system comparable to that recommended by Arator; on better lands, where fallowing is not desirable, I should prefer the three-field course; where the fallow system is to be pursued, I should generally prefer five-fields, and under certain circumstances, I should adopt the new system—but certainly, in no case where the clover husbandry would not succeed without the fear of failure. I am, indeed, now trying it on a farm that has been under the five-field system for ten years, and has become somewhat foul from that cause, and from having been but very moderately grazed; but it is my intention to continue it only for a single round of crops, and then cultivate it as heretofore, in five-fields. There is, besides, attached to this farm, a light field, which is exclusively devoted to corn, and I am thereby furnished with a sufficient hoe crop—the want of which is one great objection with me to the new system.

Perhaps it may be thought, by the admission that my lands have become foul under the five-field course, that I have furnished an argument against it; but it matters not, as I am in quest of the best system, and not an especial advocate of any. Besides, it is more than doubtful, whether there is any fallow system not liable to the same objection in a greater or less degree.

After all, much more will be found to depend on good general management, than on any rotation of crops whatever. It was long ago remarked of governments, that "that which is best administered, is best;" and certainly, however open to discussion that proposition may be, it may yet be affirmed, without the fear of contradiction, that the most profitable system of agriculture will always be found to be that which is best executed.

This system, I understand, was practised at Dover in Goochland, long before it was tried in Curl's Neck, by a Mr. Harding, who then leased the estate. The gentleman who succeeded him, informs me that he found it in a very impoverished condition, though it is admitted that Mr. Harding was a capital manager. Now, from the well known fertility of that estate, and from Mr. Harding's skill in agriculture, and from the fact stated in regard to the condition of the estate at the time he left it, it is very difficult to escape the conclusion, that it is quite an exhausting course. It must not be forgotten, however, that Mr. H. held it on lease, and no doubt less attention was paid to improvement, than if he had been the proprietor.

Before taking leave of the subject, I have only further to say, that this seems to me to be fully as much a two as a four-field system, for it is indisputably compounded of both; and perhaps it had better be called so, for though quite an easy two-field course, it is certainly a very hard four-field system.

The foregoing remarks are submitted rather in the hope of eliciting light from others, than under the expectation of throwing much on the subject myself; being fully aware, as well on account of my limited experience, as for other reasons, that it

becomes me rather to be diligent in seeking information, than to presume to afford instruction to others.

It is strange to me that any one should contend that the Pamunky plan of cultivating corn, viz. in drills, and using the hoe two or three times in the cultivation of the crop, is cheaper than where it is cultivated both ways with the plough. We are obliged, in this neighborhood, to cultivate some of our moist lands upon the Pamunky plan, and consider the labor fully double. I incline to the opinion, however, that rather more corn may be made in drills, but not enough to compensate for the extra labor. This year I had a field of 150 acres almost all laid off both ways, and not more than a third of which was hoed at all, which will yield between five and six barrels of corn per acre; and if there is a cheaper way of making corn than with the plough, it must, I think, be by the agency of steam.

W. B. H.

[It is gratifying that W. B. H. has come forward to maintain his opinions in opposition to the four-shift rotation—and it would have been more so, if the writer had given to his opinions the additional support of his name, than which, few deserve to command more respect for views upon agriculture, whether founded upon practice, or upon reasoning. It is not our intention (and it would be both uncalled for and unnecessary) to express any opinion as to the superior value of either of the rotations in question, in addition to the general remarks offered in No. 6, (page 380.) But we wish the views on both sides to be fully presented—and until recently, the advocates of the three-shift rotation, with a few exceptions, have, by their silence, apparently acquiesced in the usual sweeping denunciation of the rotation called the "three-shift," however varied it may be in operation. The peculiar advantages of the four-shift rotation (of three grain crops and clover) have been ably maintained by Mr. H. Carter and Mr. J. Selden—and if those who object to that rotation, even for good wheat soils, remain silent, it is a natural inference that their silence amounts to admission of the inferiority of their own systems. We shall be pleased to have the question discussed more at length, by writers on both sides. All the reasons given by good farmers, whether in support, or in condemnation of either rotation, will be of value to their readers—even though neither party may be able to prove a general or marked superiority of one rotation over the other.]

SHORT RULES FOR TOBACCO PLANTERS.

To the Editor of the Farmers' Register.

I send you a few plain practical rules, which I wish published in your Farmers' Register, for the special benefit of the tobacco section country.

Keep no more stock than is necessary for the domestic purposes of your farm.

Sow all your up-lands in clover, that will produce it; and the flats in herds grass.

Never exchange a good meadow, or herds grass crop, for any other.

Do not curtail, but increase your crop, especially of wheat.

Be diligent in the use of *all* the means for making manure—and never put it on land capable of bringing clover, until *all* your farm be brought under the influence of clover.

Ditch or trench your hill-sides so as to prevent its washing, or the water from flowing over it broad cast.

I feel confident in saying, that a few years adherence to the foregoing rules, will prove their utility and value. Our exhausted lands would be brought under profitable cultivation, and our crops, and also our facilities for manuring, be greatly increased. It is to the land we must look for our chief sources of manure. Let us then lay aside the false doctrine, that we cannot make tobacco and improve our lands at the same time. The prevalence of such an opinion has, heretofore, been a great barrier to improvement. I believe tobacco to be the most profitable crop that we can cultivate: it is less precarious than the cotton or wheat crop—moreover, we can cultivate to advantage, tobacco and wheat, by the addition of a few extra laborers, (not more than is usually employed in all farming countries,) and improve our land at the same time.

H. C.

MOTH WEEVIL IN CORN.

[The following article is worth notice, as showing the first appearance of the moth weevil as far north as Massachusetts. This insect not many years ago was not known west of the Blue Ridge Mountains in Virginia, nor as far north as Delaware. There is no insect more destructive to grain, where climate and the farmer's neglect favor its propagation—and none more easily guarded against by proper attention to its mode of propagation and other habits. To those who are uninformed on this subject, we will presume to recommend a perusal of the article on moth weevil in No. 6 Vol. I of Farmers' Register.]

From the New England Farmer.

Thomas G. Fessenden, Esq.—Sir, as editor of the New England Farmer, I send you two ears of corn of the growth of 1833. These are some of the ears, which were hung up for seed corn, and from appearances will give you a good idea of the manner in which we have lost about 15 bushels, which are in the ear; at least I should suppose the corn useless for bread stuff. The insect which escapes from the grain is a small insignificant looking moth or miller. You will probably find it in the grub or chrysalis state in the ears which I send you. I cannot learn that any of the farmers about here ever saw corn in this condition before. If it is a new enemy, the sooner we are made acquainted with it the better—that we may be able to guard or provide against its ravages. There has been the most mischief done in what was the softest corn.

Respectfully yours,
SAMUEL PLANT.

From the New England Farmer.

SOIL OF PLYMOUTH [MASS.]

MR. FESSENDEN—Dear Sir, I beg leave through your valuable paper to correct an erroneous opinion which is abroad relative to the soil of

this ancient town. The impression seems to be that it is peculiarly barren, a mere sand-heap, unsuceptible of vegetation, and that our fathers trudged over a depth of sand, like snow-drifts, and subsisted on lobsters, eels, and clams. This may have been something near the truth in their 'days of small things,' but however unfortunate in their location were our pilgrim fathers, it is clear that their enterprising posterity have successfully applied a remedy to some of the embarrassments with which those good men were afflicted, and meliorated the condition of things far surpassing the conception of the original settlers. True it is, that a tract of land in the vicinity of the town consists of unproductive sandy pine hills, but bordering on the shore, our well cultivated soil will compare with the best in New England. The first crop of ruta bage produced in this county, if not in New England, was raised in this town, and obtained the premium in 1819. Wheat and rye have been produced from our soil at more than thirty-three bushels per acre, both of which have obtained premiums; of the latter article, forty-three bushels were raised on one acre and seven rods, by an industrious farmer in this town, a few years since, for which a premium was awarded by the Plymouth Agricultural Society. But the following example, it is believed, sets at defiance the rivalry of the most improved agriculturist. Dr. Charles Cotton, of this town, occupying a piece of reclaimed swamp, has, by judicious management, the past season, produced more than four tons of hay, clover, and herd's grass, to the acre. The hay was thoroughly dried, and accurately weighed by the town weigher, and the land surveyed with the view of a premium, but no premium was offered for hay by the Plymouth Agricultural Society. The land measured one acre and a half and nine rods, and the hay weighed six tons eight hundred and ten pounds, being four tons two hundred and fourteen pounds to the acre. The second crop of grass standing on the meadow, was estimated at more than two tons, but was not mowed. Fruit trees flourish well here, excepting the peach, which generally suffers essential injury from spring frost, and cold easterly winds. In some instances, however, we have witnessed abundance of fruit from peach trees in favorable seasons and situations in our gardens.

Our attempts to cultivate the foreign vines have in general been unsuccessful; but the *Isabella* is very productive, and the fruit is delicious, when well matured and free from disease. It is much to be desired that some person whose experience and observation entitle him to confidence, will direct us to the most profitable method of cultivating this vine. In one instance, within my observation, a vine extends its numerous branches to the roof of a high building, and spreads in different directions several hundred feet. This vine is abundantly productive, but its fruit is not large, and is every year more or less affected with mildew; whether this is to be ascribed to any peculiarity of location, I am unable to decide. In other instances, where the vine has been subjected to moderate pruning, all superfluous and unripened wood cut away, and the whole extent confined to 12 or 15 feet, I have observed the largest and best matured fruit, but very close pruning is, according to my judgement, always injurious. I have yet had

no opportunity to ascertain whether the Catawba grape will attain to a mature state of ripeness in our climate: I hope you or some correspondent will inform us. It appears in the Farmer of October 22d, that James McArthur, Esq. raised the past season, the extraordinary quantity of sixteen bushels of grapes, in the cold climate of the State of Maine; if that gentleman has adopted any method of culture, different from the common practice, the particulars would be acceptable.

In your paper of the 5th instant, Mr. Editor, you tantalised your readers by a notice of an extraordinary large Angouleme pear, which measured a foot round, and took eight gentlemen to eat it. It is hoped that this will serve to encourage the cultivation of this excellent fruit more generally among us.

Now I hope your readers will excuse me if I recur to some reminiscences to show that fat oxen of extraordinary size were not unknown in former times. In April, 1773, a fat ox, raised by Lieutenant Joseph Baker, of Westborough, when seven years old, weighed 2,501 pounds, was five feet eleven inches high, measured nine feet three inches round, twelve feet two inches from his nose to his rump, and five feet from the top of his withers to the bottom of his brisket.

Still larger. June 24, 1779. I have just had the satisfaction of viewing the largest fat ox perhaps ever seen. He is six feet seven inches high, and weighs on the hoof 3,500 pounds. This noble animal was presented by some gentlemen in Connecticut, to His Excellency General Washington; it would seem therefore that at one period they were free from starvation at head quarters. I presume that our agricultural societies with all their commendable improvements, cannot boast of an ox of equal weight and measure to the one above described.

I subscribe myself, very respectfully,

Your humble servant,

JAMES THACHER.

N. B. I am just informed that a friend at Kingston has recently taken a pear from his tree, a *Bon Chretien*, which measures eleven inches and one third of an inch round.

GENERAL OBSERVATIONS ON IMPROVEMENT, AND QUERIES ON HERDS GRASS.

To the Editor of the Farmers' Register.

Agriculture lies at the foundation of every thing useful, or comfortable, or desirable in human life. It is therefore a subject of the utmost importance, not only to the agriculturists themselves, but to the whole community, that a gradual system of improvement of the soil and of its production, should be encouraged, and those having immediate interest therein, stimulated by all the information possible to be obtained on the subject. I am happy to say, and be able to bear witness, that your valuable periodical has had, and continues to have, a very desirable effect in that way. It has given more light on the subject, and caused more emulation and energetic exertion, than all the agricultural papers ever published in this country. It has been the means of arousing our farmers from their indolence and supineness, and causing them to look around themselves for the

means of improving their farms. Many of us now make 20 and 30 loads of manure where we formerly made one—we attend more in person to our business, relying less upon overseers and our negroes to conduct and manage business in their own way. The more attention we give to our farming business, the more interest we feel in their good management and improvement: and, much to our satisfaction, we find our crops come in more abundantly, though the drought last summer injured our crops very much. The cotton crop I think is lessened one half in my neighborhood—the disadvantages under which we labor to guard our crops from the ravages of stock in this county is a serious one. The time now spent, every year in getting rails, hauling them, and putting up and repairing fences, would be, under other circumstances, very advantageously applied to the collecting and raising manure, which in a few years, would produce a very desirable change in the appearance of our old worn out fields. I am glad to see that this important matter is now being handled by abler pens than mine; and I hope sincerely, it will not be long before our legislature will take up the subject, and pass a law requiring every person to keep their stock enclosed, and thereby reduce our fencing to standing pastures only. I think the Assembly might do more essential good in legislating upon this subject—a matter coming directly under their supervision—than all they have said, and can say or do, in relation to the constitutionality or unconstitutionality of the United States Bank, and the removal of the public moneys from its vaults, about which so much was said last winter, and all to no good effect.

Some time ago I propounded some queries to you, concerning the seeding and growth of herds grass, which I perceive was lost or mislaid, and therefore not inserted in your last number. I intended to have seeded several acres of land in that kind of grass this fall, but have declined it until spring, the greater part of which is low, wet and oozy, consequently cold and unproductive in corn, except occasionally, when we have a warm dry season, and but moderate rains in summer. Would it be proper to fill up the ditches in preparing the land for the seed, so as to have it an entire level surface, as nearly so as possible? Some of these wet places are within a few hundred yards of my dwelling—is it probable that the health of the family would be affected by the growth of the grass, or its conversion into hay? or would it be less apt to affect the health if kept constantly grazed close? Your opinion in relation to the value and growth of this grass generally, would be gratifying to me.

A. B.

Surry County, November 17th, 1834.

RICHMOND, FREDERICKSBURG AND POTOMAC RAILWAY.

The friends of this important work will be pleased to learn, that the location of the first section is nearly completed, and is likely to be placed under contract in the early part of the winter. The Compiler says:

The location of the first 18 miles of our rail road is now rapidly progressing, and is expected to be prepared for contract at an early period of the winter. It is understood that the improve-

ments which have been made both as to the character and expense of this portion of the road, are greater even than were anticipated by the engineer of the work, Moncure Robinson, Esq at the time of making his report in January last.—The portion of the line, from the probable point of branching to the coal pits, to Richmond, is so peculiarly favorable, that a locomotive engine can transport over it with ease 2000 bushels of coal at a load. The Valley of Falling Creek which is used in effecting a descent to that of the South Anna, is believed to possess decided advantages over any other approach to this river or the Pamunky, within ten miles in either direction.

The whole, cost of the road when completed to this valley will fall short of \$140,000. The line passes through large tracts of woodland, the owners of which can send wood to market, during the winter months, at a profit to themselves as well as to the company. All damages have been relinquished by the landholders, and timber for the purposes of the company is abundant.

On the whole we may look with entire confidence to the completion of this third part of the road in one year from this time, and during the winter of 1835-6 a large amount of business may be expected to be done.

LIST OF RAIL ROADS AND CANALS, COMPLETED, OR IN PROGRESS, IN THE UNITED STATES.

[The following list which is annexed to Tanner's Rail Road Map, may be useful as well as interesting, though probably all the care and accuracy for which Mr. Tanner is distinguished, have not prevented important errors being admitted. A striking example is presented in putting down, as completed, a rail road from Petersburg to Richmond, a route on which such a work has not yet been proposed, nor even thought of seriously. There are also sundry errors of the press which are doubtless attributable to the reprint which we copy, not having seen the original publication.]

Maine

	Length.	Cost.
Cumb'd and Oxford Canal, 20½ miles		\$250,000

New Hampshire.

Bow Canal	¾	\$25,000
Amoskeag Canal		50,000
Hookset Canal	825 feet	17,000
Union Canal	9 miles	50,000

Vermont.

There are several canals in this State, viz. Bel-
low's Falls, A erquec ney, and White River, all
of which are designed to overcome falls in the
Connecticut river.

Massachusetts.

Canals.

Middlesex Canal	27	\$528,000
Pautucket	1½	
Blackstone	45	600,000
Montague	3	

South Hadley	2		Del. Div. of Penn. Canal	59	1,275,705
<i>Rail Roads.</i>			Pittsburg and Erie Canal		
Boston and Worcester	45	est. \$883,904	as far as completed	25	
Boston and Providence	48		French Creek in progress)	25½	
Boston and Lowell	25		Schuylkill Canal	108	2,500,176
Quincy	3		Union Canal	82	
Besides several proposed roads.			Lehigh Company's Canals	46	1,558,000
			Conestoga Navigation	18	
			Codorus do.	11	
<i>Rhode Island.</i>			West Philadelphia Canal		
Stonington Rail Road	46		<i>Rail Roads.</i>		
			Columbia Rail Road	81	1,600,000
<i>Connecticut.</i>			Alleghany Portage	32	
			Mauch Chunk	5	
Farmington Canal	22	\$600,000	Room Run	5	
Enfield Canal	5½		Mount Carbon	7	
			Schuylkill Valley	15	per mile 5,500
<i>New York.</i>			Schuylkill Rail Road	13	7,000
			Mill Creek	7	20,000
<i>Canals.</i>			Mine Hill and Sch. Haven	20	160,000
Eric Canal	363	\$9,500,000	Pine Grove	4	
Champlain Canal	72	1,179,972	Little Schuylkill	23	
Hudson and Delaware	65½		Lackawaxen	16½	100,000
Lackawaxen	56		West Chester	9	90,000
This is a prolongation of the Hudson and Delaware Canal. Thirty-six miles of its total length are in the State of Pennsylvania.			Germantown	7	
Oswego	38	\$525,115	Lykens Valley		
Seneca	20	214,000	Philadelphia and Trenton	26½	
Chemung	31	300,000	Central Rail Road	51	
Crooked Lake	7	120,000	Oxford, from the Columbia		
Tonnewanta	13		R. R. to the Maryland		
Harlaeni	8		line (now in progress)		
Chattanooga	14		Norristown & Reading (in progress)	43	est. 947,425
<i>Canals in progress.</i>					
Chenango	93	est. cost 944,800	<i>Delaware.</i>		
Black River	40		Chesapeake and Del. Canal	12½	\$2,200,000
Sodus Canal			New Castle and French-		
<i>Rail Roads.</i>			town Rail Road	16	400,000
Mohawk and Hudson	16	\$700,000			
Schenectady and Saratoga	20	250,900	<i>Maryland.</i>		
Catskill and Canajoharie	70	(in progress.)	<i>Canals.</i>		
Ithaca and Oswego	29	150,000	Chesapeake and Ohio	341½	
Rochester, (in progress)			Port Deposit Canal	10	
Schenectady and Utica	80		Potomac Falls	2½	
Ruth	5		Great Falls	1200	yards
Rochester and Batavia	28		<i>Rail Roads.</i>		
Troy and Ballston	52		Balt. and Ohio	80½	
			Balt. and Susquehannah	76	
<i>New Jersey.</i>			Balt. and Port Deposit		
			Balt. and Washington	37½	est. 1,433,644
<i>Canals.</i>					
Delaware & Raritan Canal	43		<i>District of Columbia.</i>		
Morris	101	1,200,000	Washington Branch Canal	1½	25,974
Salem	4		Alexandria	7½	est. 372,208
Washington	1				
<i>Rail Roads.</i>			<i>Virginia.</i>		
Camden and Amboy	61		<i>Canals.</i>		
Paterson and Hudson	16		James River		
Jersey city & N. Brunswick	28		Jackson River	30½	23,295
			Balcony Falls	6½	340,000
<i>Pennsylvania.</i>			Dismal Swamp	23	
			<i>Rail Roads.</i>		
<i>Canals.</i>			Manchester	14	
Cent. Division Penn. Canal	171½		Petersburg and Roanoke	59½	
Western Division do.	104	\$3,000,000	Portsmouth and Roanoke	80	
Susquehanna Div. do.	39	1,039,250	Richmond and Petersburg	21½	(in progress)
West Branch Canal	65	927,378	Rich. and Fredericksburg	64	do.
North Branch Division	6½	1,096,178	Belleplain	11	
Extension of the above to Lackawaxen	14	220,594			

<i>North Carolina.</i>		
Lake Drummond Canal	5	
North West Canal	6	
Weldon Canal	12	
Clubfoot and Harlow Canal	1½	
<i>South Carolina.</i>		
Charleston and Augusta Rail Road	130½	
<i>Canals.</i>		
Santee Canal	22	\$700,000
Winyaw	7½	
Catawba		
Saluda	6½	
Drehr's	1½	
Loridh's	1½	
Lockhart's	2½	
<i>Georgia.</i>		
Savan. & Ogechee Canal	16	\$165,000
Matamaba and Brunswick	12	
<i>Alabama.</i>		
Decatur Rail Road	62	(in progress)
Huntsville Canal	16	
<i>Mississippi.</i>		
St. Francisville and Woodville Rail Road	26	
Vicksburg and Weston	37	
<i>Louisiana.</i>		
New Orleans and Pontchartrain Rail Road	5	380,000
<i>Canals.</i>		
La Fourche Canal		
L. Veret Canal	8	
N. O. & Pontchartrain Canal	6	
<i>Kentucky.</i>		
Louisville and Portland Canal	1½	730,000
Lexington and Ohio Rail Road		est. 1,000,000
<i>Ohio.</i>		
Ohio and Erie Canal	307	
Miami Canal	68	746,852
<i>Canada.</i>		
Rideau Canal	129½	(in progress)
Welland Canal		

In addition to these roads and canals, various others, some of them of great magnitude, are spoken of in several states, particularly in Pennsylvania, New York, New Jersey, Maryland and Kentucky. In the course of a few years, they will no doubt all be completed.

From the *Maine Farmer*.

PRESERVING METALS FROM RUST.

It is strange how slowly improvements and discoveries oftentimes creep over the country, and how long a time it takes for an important fact which partakes of a little science, to become generally known and applied to practical purposes.

Every one knows, or ought to know, that there is such a thing or power in nature as electricity—that there appears to be either two kinds of this fluid, or that some bodies naturally contain an extra quantity, and some are deficient of it—that according to Franklin's theory, bodies with a surplus of it are said to be positively electrified, and those bodies which lack are said to be negatively electrified—and those bodies which are positive attract the negative, and repel those that are positive—while those that are negative attract the positive and repel the negative—or in other words, the same kind of electricity repels its own kind, and attracts the opposite. Every one knows, or ought to know, that there is such a thing as oxygen in the atmosphere, or perhaps better known by the name of vital air. That it is the union of this substance called oxygen which causes some bodies to become oxidized, or if that term smacks too much of "book learning" you may say they become rusted.

It is several years since Sir Humphrey Davy discovered the fact, that the metals were as it regards electricity, positive, and that this vital air or oxygen was by nature negative, and that according to the laws of electricity, the metals had an attraction for oxygen and become rusted. He also discovered the fact, that the metals varied somewhat in their characters in regard to their electrical states; and that when two pieces of metal were put in contact, one of them would become positive and the other negative; of course according to the laws laid down by Franklin as above mentioned, the metal which would become in a positive state of electricity would attract the oxygen (because it is negative) and be rusted, and the other metal would repel it and remain unrusted. A piece of zinc about the size of a pea would protect 40 or 50 square inches of copper if soldered upon it and plunged into sea water—whereas if the copper were plunged in alone, it would become corroded.

He accordingly concluded that by soldering pieces of zinc to the copper bottom of ships, the copper would be preserved as long as the zinc lasted. The experiment was tried—a ship was so prepared, and sent out on a long voyage. On her return she was examined—the copper was preserved according to expectation, but an unexpected evil had taken place. The worms and barnacles and sea weeds, which, when it is not thus protected, were prevented from attaching themselves by the bad taste of the copper as it became corroded and dissolved by the sea water, now finding nothing but a smooth, clean surface, and no bad taste, stuck themselves on in immense numbers, and retarded the ship's motion. Thus the matter rested for a long time. Some ingenious surgical instrument makers have recently applied slips of zinc beneath the handles, next to the steel, and thus preventing in a great degree the rusting of these articles. But now, gentle reader—brother farmer—brother chip, or whoever thou art, that has gone thus far with us in this brief statement of facts, can this principle be put to no other good

uses—could not your copper kettle, if you have one be protected from rust by soldering some zinc here and there? Zinc is cheap and easily procured, and may be renewed, when by shielding the copper it shall become thoroughly oxidized itself. May not your scythe, your hoe, your ploughshare have a patch of zinc upon it, and thus be prevented from rusting when laid away? Could not your chisels, your axes and tools have a little put upon them by way of an *antirustmatic*, and thus be kept bright? could it not be applied in a thousand useful ways not now thought of? Ponder upon the subject—try the experiment, and let us hear the result.

From the American Farmer.

ON THE CULTURE OF THE VINE, AND ON WINE MAKING IN THE UNITED STATES.

By N. HERBEMONT, of Columbia, S. C.

On the culture of the vine.

That the culture of the vine does not involve any great mystery, and that it is not carried on through very difficult processes, is abundantly evident by the great variety of methods used in the different parts of the world where that culture is attended to; for, not only do the practices of various countries differ from each other, but perhaps also there are no two sections of the same country where the practice or mode of culture is precisely the same. Although we cannot doubt that some of these are preferable to others, yet all are attended with a success more or less perfect; besides which it is most probable that the infinite varieties of sites, soils and climates, as also the most innumerable varieties of the vines themselves must render some difference necessary for the various particular circumstances. Admitting these observations to be correct, the choice of the particular method of culture, and of all the cares it requires, must rest chiefly on the judgement of the owner of the vineyard, or of the practical man that works it. It necessarily follows, from these premises, that the culture of the vine is not only unattended with difficulties, but that any variation from the best mode may not necessarily be followed by ruinous consequences. General principles are then all sufficient with persons possessed of any judgement, and it is useless to write for others. An enlightened cultivator of this or any other plant, ought to be acquainted with the doctrines of vegetable physiology, and from his practice form his own judgement of the peculiar habits of the plant he cultivates, and of the various circumstances that may properly modify its culture.

Plants grow, increase in bulk, and are kept in a healthful state from the abundance and nature of the food that nourishes them, and this they extract from the earth by means of their roots, and from the air by their leaves and other tender parts. The vine is naturally disposed to push shoots of very great length, so that in rich soils it climbs to the tops of very high trees. The roots of plants are usually proportionate to their tops; hence it follows that the vine thrives best in a soil that is loose and easily penetrated by its long roots which go to a considerable depth in search of moisture as a necessary supply for the great expenditure of it, which it must suffer by its very extended ramification and abundant foliage. The latter, however,

imbibes from the air, particularly in the night, a great proportion of the moisture necessary for its support, and also to furnish for this expenditure during the day. The abundance and quality of its fruit depend, in a great measure, on the just equilibrium between this supply of food and moisture and its due evaporation. If there be a superabundance of it, the grapes are too watery and deficient in saccharine matter and other necessary ingredients to form a perfect fruit, and it is moreover very liable to rot under these circumstances. To obtain good, sound and rich grapes, it is probably better that the supply of moisture be rather deficient than over-abundant, and under any circumstance, the soil and situation for a vineyard ought to be selected with this object in view, and also that the supply of moisture be as regular as the nature of things will admit, and that as much as is practicable, independently of the seasons, whether these are dry or wet. A light, deep and permeable soil seems to offer these conditions; for in such, the roots of the vines, if these have been planted at a sufficient depth, will reach to where water is never very greatly exhausted, nor ever greatly superabundant. In a severe drought the moisture of the earth is only diminished, but never exhausted, below a few inches of the surface; and this is rendered evident from this, that during such a season, when most other plants are deficient in dew in the morning, a little drop of it is usually found at every point of the leaves of the vine, which shows either that its roots furnish the supply from the great depth to which they descend, or that the leaves by their temperature, probably occasioned by this very supply, condense during the night, what little moisture is in the air; though during such periods of great drought, the neighboring plants seem not to have this property, at least in an equal degree. On the other hand, when the season is uncommonly wet, particularly when this is not so much caused by the frequency of the rains as by the great quantity of water that sometimes falls in a very short time, the roots of the vine which are at a considerable depth, are not suddenly affected by it; for rain does not sink rapidly and deep. On the contrary, it may be observed by any person, that after a spell of wet weather of several days continuance, the water has penetrated only a few inches, at least in any considerable quantity. The roots, then, are not drenched with a superabundant moisture, unless they are within a short distance from the surface. The management and culture of the vine must then be with a view to these effects, and the same precautions tend to guard against both cases. It is endeavored to attain these desirable objects by various means. First, in planting the vines, the holes or trenches should be made much deeper than its present roots will reach, and if manure is used, a portion of it should be spaded in the bottom of the hole for the purpose of inducing them to grow downwards. The vine is also planted somewhat deeper than it was in its natural situation taking care not to fill up the hole even with the surface, lest the plant should suffer after its transplantation from the want of the due influence of the air and other atmospherical action on its roots. It is thought best to leave the holes unfilled by eight to twelve inches, and gradually to fill them up in the course of one, two, or even three years, according to the depth to be thus filled up. By

this means the plant gets accustomed to grow with its roots deeper than it would otherwise do. Another practice followed with the same view, or rather to obtain a continuance of the same end, is every fall to take away the earth at the foot of the vine to the depth of six to eight inches, or thereabout, and to cut off all the surface or horizontal roots within that depth. It seems reasonable to suppose that this operation must induce the vine to have its dependence on its lower roots, the upper ones having been suppressed. Now it has been shown that the drought does not very materially affect the earth below a few inches, except very gradually, the supply of moisture will then be rendered more uniform by the roots being deep, and, in wet weather, the upper roots having been suppressed, they cannot furnish to the vines so great an addition to its usual moisture, as would be the case if these roots had been suffered to remain within the immediate influence of the weather. This practice, therefore, also tends to equalize the supply of moisture during a rainy season as well as during one of drought. Experience having proved that the grapes are very liable to rot when the season is very wet, it appears, therefore, advisable to adopt the practice here above noticed, so as to counteract, as much as in the power of man, the irregularities or intemperatures of the seasons. As it has been showed, it is hoped satisfactorily, that it is desirable to have the vine rather dry than moist, it follows, of course, that a high, clear and open place is the most suitable, and that the proximity of dense forests is injurious, by retaining a damp atmosphere, when on the contrary a free circulation of dry air is beneficial. This observation is sanctioned by the experience of thousands of years, and Virgil has said, "*Denique apertos—Bacchus amat colles.*"

The cultivation or the stirring of the soil is next to be considered. The general practice in Europe is to stir the soil deep and often, and it is therefore universally recommended as a *sine qua non*. It may seem presumptuous to doubt the advantages of this practice in every situation and climate; but it seems to me that reasoning on the objects in view, it may be more injurious than useful in a climate subject to long and heavy rains. The oftener and the deeper the soil is stirred, either by the spade, hoe or plough, the more rain it will imbibe, and if it be desirable to have less of it, it follows that in such a climate the earth ought not to be stirred either often or deep, but just sufficiently to keep the field clear of grass and weeds. In support of this *heretical opinion*, I will ask, whether it is not, in this country, universally seen that vines planted in yards, in towns, and similar situations, where the surface is never stirred up, but always beaten hard and frequently paved, generally succeed better and much more seldom fail, than in more open cultivated situations and in field culture? And are not our abandoned old fields proverbial for producing great crops of our native grapes? These facts cannot be doubted. Now it is evident, that in such situations the earth imbibes very little water from the rains compared with the cultivated fields; for it runs off as fast as it falls, and the number of houses which cover the ground of their vicinity, must undoubtedly keep the earth much more dry than in the country. Add to this the streets by which they are surrounded, and which are always hard and many of them paved, suffer

the greatest portion of the rain that fall on them to run off, whereby the earth in all the neighborhood is necessarily much more dry than the fields.* If it is true, then, and it seems to me that it cannot be doubted that the vines growing in such places bear better and more surely, it follows that the nearer the situation and other circumstances of a vineyard approaches to this state of things, the more we have a right to expect success in our attempts at cultivating the vine extensively in this country. As the abundance of moisture is not opposed to the growing of the vine, but on the contrary assists it, a young plantation should be treated differently, and the ground should be kept loose and perfectly free from weeds and grass, until the young vines have taken a permanent hold of the soil, and the better to secure this, I would advise the application of some well rotted manure, vegetable earth, or the like, mixed with the natural soil into which they are planted. This will insure to them a strong growth which is desirable at first.

The pruning is also to be noticed. And here I shall observe, that we ought, in all our attempts at cultivating the vine, or, indeed, any thing else, our first object ought to be to assist nature in her operations; but never to oppose her with right down contradiction in her modes of proceeding; though we may avail ourselves freely of her willingness to change somewhat her ordinary course to accommodate us. The usual method in Europe is to keep the vines low, and to prune very close, by which means the young shoots are proportionably large, vigorous and sappy. Every part of the vine of the summer's growth, is larger and more succulent than if it had not been pruned. This, it appears, has somewhat the same effect that a greater degree of fertility of the soil would produce. Another effect is, that by suffering a much smaller number of shoots to grow, the vines are more open, by which a freer circulation of air among them is obtained. It may be observed here, that within certain limits, the poorer and drier the soil is, the richer the fruit, though less abundant. The more freely the sap runs up to the ends of the growth, the more vigorous and large this growth seems to be. To procure, therefore, as great a crop as desirable, without running the risk of having the fruit too weak in saccharine matter, the practice frequently obtains to prune short, viz: to three or four buds, more or less, according to the strength of the vine, every shoot of a vine except one which is kept two or three feet long, but bent round so as to form a circle by tying the end of it to the foot of the vine, near about the place where this shoot takes its rise. Mr. Forsyth aims at the same object when he recommends to trim the young shoots of the preceding year's growth, which he keeps much longer than is done in vineyards, horizontally in a serpentine form, by which the movement of the sap is rendered more slow. When we understand the object and effect of these practices, we can govern ourselves so as to obtain the same effect by similar means adapted to our circumstances. That the grapes of old vines are richer than those of young ones, must be account-

* It is evident that the chief argument refers principally to the vines in yards and in towns. Those in the old fields partake of the advantage of trodden ground, though in a less degree; but they are natives.

ed for on the same principles; for young vines push with a much greater luxuriance than old ones, and bear accordingly a more watery fruit. This, I believe, is the case generally with all sorts of fruits, and it is frequently found that when the trees are planted into too fertile a soil, they bear little or no fruit; the little they bear being very inferior. This, at least, is the case with the peach.

Whether it be owing to our soils and climate, or to the nature of the vines which we cultivate most successfully, or to both causes combined, certain it is, that our vines grow larger here than in Europe. We should, therefore, adapt ourselves to our circumstances, and prune and train them accordingly. Young vines, about six to twelve years old, are often seen to put forth shoots in the course of one summer, from thirty to fifty feet long. It is impracticable to keep such vines within the height of three or four feet altogether, as is the case in most of the vineyards of France. The object that nature seems to have in view is to form a large tree, and if we employ all our art and skill to defeat her, it appears to me that it must be to our disadvantage. During these years of great growth, then the pruning ought to be such as to moderate only this propensity of the vine to its enlargement, but not to destroy it.

At the first planting of a vine, it ought to be cut down to one or two buds, so as to give it no more to do than its impeded vigor will allow it to perform. By this means, instead of having a number of slender weakly shoots, we shall have one or two strong ones, that will give us the prospect of a luxuriant healthy vine. The second year, the vine ought to be pruned short again, to about three or four buds, and suffer only one or two of these to grow. This course may be followed, gradually increasing the length of the vine, until it has attained to a considerable extension. The longest and strongest shoots ought to be shortened in proportion to their strength, and trained horizontally, or nearly so, in such a manner as to fill up as evenly as possible, the space allotted for it, suppressing entirely all the weaker ones, those that are misplaced, and cutting down to four, to eight or ten buds, the middle sized ones, and be sure not to leave too many of them, that in the summer the vine be not too bushy and confused.

I train mine to the height of about eight feet, and then lead them horizontally overhead on a coarse trellis formed of laths, either split or sawed. This trellis is supported by posts merely split, as if intended for a common worm-fence, or sawed when a saw mill is convenient. These should be made of the most durable wood I can get, (here we use light wood.) This frame or trellis forms squares of about two feet and a half, and to it I tie the vines with willow twigs. There is a considerable advantage in tying the vine on the under part, instead of on the top, which is this: when in the spring the shoots are growing luxuriantly, they are easily broken off by the wind, if they are not supported, and they are too tender to be bent down to the trellis. The frame of the trellis is formed of laths four inches wide by one inch and a quarter thick, placed edgewise. The vine being tied under this, the young shoots readily find a support against the smaller laths nailed on the top of the larger ones; or they may be gently inclined towards them and fastened by some soft substance, and very few are broken down by the wind. In

this manner of attaching the vine to the frame or trellis, all the old wood, even that of the preceding year's growth, is fastened underneath the laths, and all, or nearly all the young growth, rests on the top, fastened down to any part of the trellis, and the grapes hang down between the laths, the foliage being thereby above, protecting the fruit from the immediate action of the sun, and direct influence of intemperate weather. A full grown vine well trained and spread in this manner, with its fruit hanging down, and surmounted by the green canopy of the leaves, is a very beautiful sight. Another slight advantage of this manner of training is, that the grapes cannot be seen from above, and that, therefore, the birds are much less attracted by them. An old vine is to be pruned according to the same principles, and in pursuance of the same views, as the younger ones, viz: to leave only as many bearing branches as are necessary to fill up the space, and less than this if the space is great, and prune them shorter or longer according to their strength and the number of them; figuring to one's self whilst pruning, the effect of the future shoots, both in filling the space, and in being sufficiently distant from each other, as not to be crowded and impede the free circulation of the air. It is, of course, better that there should be some vacancies between the growing shoots than that these should be too close.

As the vine is growing, it is advantageous to take off the *interleaves* or side shoots, called by some "robbers," and also the claspers, at least as high as two or three buds above the fruit; but, as you thereby deprive the vine of its natural means of fastening itself to the frame for support, their place (the claspers) should be supplied by tying them in their suitable places, with some soft substance, such as bass-matting, bullrush, or even corn shuck, softened in water. The claspers, if left near the fruit, are apt to entwine round it and injure it greatly. I call "*interleaves*," those secondary shoots that grow on the primary ones, at every joint, and seem destined to protect the buds that are intended for the following year's growth; and it may be better to cut them off, leaving about half an inch of it, than break them off close to the principal stem and the buds they protect. Be this, as it may, if they are all left, some of them do sometimes grow too large, shade the fruit too much, and seem to nearly obliterate the bud which we think they feed and protect. The leaves ought never to be pulled off, particularly near the fruit, except perhaps when it is nearly ripe; for they are a provision of nature to procure food, sustenance and protection to the buds destined for the following year's growth; for if the leaves are pulled off, these buds would thereby be starved. If such leaves are ever suppressed from necessity, they should be cut off so as to leave the greatest part of their footstalk or stem. Neither should the principal shoots be shortened, nor, at any rate, until late in the season, and when the fruit is nearly ripe. The shortening of them induces the interleaves to grow much more than they would otherwise; and if they are cut off only a few buds above the fruit, this operation usually forces the growth of the buds depended upon for the following year's fruit, as well as its accompanying appendages of leaves, &c. This operation, in several kinds of vines, makes them produce a second crop of grapes which may ripen tolerably late in the fall, but sel-

dom uniformly and as perfectly as the first; and this is, moreover, as stated above, at the expense of the following year's crop, and to the injury of the vine. If this be ever done for the purpose of obtaining a second crop of grapes, only one branch, or rather shoot, ought to be so treated, unless the vine is large and very luxuriant, when two shoots to each such a vine may be made thus to perform a double task. I know that this operation of shortening the shoots is recommended by many writers on the subject, and this with the view, as they say, to throw more sap and nourishment into the fruit. In this I believe they are mistaken; or, if not, I am satisfied it will not answer a good purpose in our climate and with our luxuriantly growing vines. It seems to me that the reasoning of these writers is not correct; for, if plants take in nourishment from the atmosphere by their leaves, the suppression of a considerable part of the leaves bearing shoots, must deprive the vine of a part of its expected food; though, perhaps, the fruit may be rendered thereby the richer in saccharine matter, by subtracting from the luxuriance of the vine. This may be the case, though my experience seems not favorable to such a conclusion; besides the inconvenience of losing the buds of the next year's crop. In order to ascertain, in some degree, the effect of shortening the shoots on the fruit, and to prevent the growing of the interleaves and buds, I have several times operated as follows, on shoots which I intended to be cut off at the following pruning. After cutting off the shoot two or three buds above the fruit, I carefully with a pen-knife scooped out all the buds of the shoot, taking care not to injure the principal leaves. The effect on the fruit was so insignificant as not to be observable. The grapes ripened well, but were neither larger nor better than the others; indeed they were rather smaller.

On wine making.

Wine is the fermented juice of the grape; any thing else, though it may be called by this name, is not wine, but only an adulteration or an imitation of it, which may be palatable, pleasant, and perchance, wholesome. By far the greater part of those liquors that are generally known by the names of "home made wine," "manufactured wine," &c., and even many that are sold as genuine, are compounds which are frequently injurious to health, and very seldom inoffensive as a usual beverage. It has been observed that the people of this country are more liable to dyspepsia, liver complaints, and other diseases of a similar nature, and that the frequent use of ardent spirits, even in a very diluted state, or disguised under the form of various wines, is the chief, if not the only cause of it. A taste for strong wines has, unfortunately for us, been produced, probably by the first importers of wines across the ocean, who, fearing lest it should not resist the effect of so long a voyage, thought of securing it by adding to it a quantity of brandy; and a wine which is not strong enough, when drank in a very moderate quantity, to produce something like an incipient state of intoxication, has been rejected as trash, and a decided preference given to such as had a powerful effect. Really good and genuine wine is among the best of the numerous blessings that a kind providence has bestowed on man, to assist him in supporting

the many vicissitudes to which he is exposed; and, without it, this would truly be "a valley of tears." But like most other valuable gifts, it has been abused, and what was intended to induce good and social feelings between man and man, to produce cheerfulness and a becoming hilarity, temperance and health, has been converted into an engine of mischief, ill-temper and disease.

It is very difficult to counteract habits and opinions of long standing, even when they are admitted to be founded on error, and very injurious. We cannot, therefore, expect to gain an unqualified assent to the propositions here above enounced, or that implicit submission will be yielded to them. Believing firmly as I do, that the promulgation of them, and the offering as a proof of the assertions here made, an opportunity of giving them a full trial, I conceive it my duty to exert my feeble efforts to induce the real philanthropists of this country, to make a full trial of cultivating the vine, and of making wine which they will know to be unadulterated; satisfied that good genuine wine, like virtue, need only to be truly known to be truly loved.

The methods of making wine in various parts of the world are as diversified as the culture of the vine itself. They are founded, however, on general principles which must be understood before success can reasonably be expected. It is needless here to give an elaborate analysis of wine. It is sufficient to say that grapes being fully ripe, contain, besides other ingredients necessary to produce fermentation, a quantity of sugar, which the process of fermentation disposes to be converted into alcohol, which may be obtained from it by the process of distillation. The unfermented juice of the grape, which is called "must," is very sweet; but when it has become wine by fermentation, scarcely any remnant of a sugary taste is perceptible. It has then become fit for use, being nutritive, stomachic, and exhilarating, according to the proportion of the sugar it originally contained, and the perfection of the fermenting process. Fermentation goes on, though insensibly, for a long time, even for years, when the liquor becomes more perfect, more mellow and pleasant: in short it becomes good old wine.

Before one proceeds to the gathering of the grapes, every implement used, vats, press, casks, &c. must have been prepared before hand with the utmost care. Great nicety and perfect cleanliness, are of the utmost importance; for there is perhaps nothing that takes so readily the taste of substances with which it comes into contact as wine. Every vessel, then, that is to contain it in any stage of the process must be properly cleansed, and if new casks are used, great care must be had that they have been well charred inside, and purified by repeated washings with water, common salt, and lime or ashes. Some recommend a decoction of grapevine leaves poured hot into the casks, and afterwards well rinsed with pure water, and well drained. If the casks have contained wine, one of the heads is to be taken out, and the inside will be found incrustated with tartar which must be scraped out, and then it is to be cleansed as above stated, for the new ones, except that they need no charring, nor long soaking to extract the taste and coloring matter of the wood, as new vessels do. I have generally found that vessels that have contained French brandy, particularly that

which is not highly colored, are the best seasoned of any for wine. Other spirits, such as whiskey, apple or peach brandy and rum, give the casks a taste which can scarcely ever be got rid of. After the casks have been well drained and are dry inside, the finishing preparation is to burn a sulphur match within them, and put in the bung, when it is fit to receive the liquor. The sulphur matches are made by dipping strips of coarse linen or cotton cloth into melted brimstone. A piece of it about an inch wide, and three or four inches long, is enough for a quarter cask. It is lighted and suspended by a wire so as to be about the middle of the cask. The bung is used to stop the hole and hold the wire to its place while the match is burning, which takes place in a minute or so. It is proper to observe that casks used for new wine ought to be very strong, and of very thick staves, or else after the sensible fermentation is over, and the bung is driven in close, the insensible fermentation which still goes on, will force the wine through many places that would have contained almost any other liquid without the least leakage.

There is not much danger of the grapes being too ripe for wine, and the vigneron must be aware that it is only when grapes have acquired the utmost degree of maturity, that they contain as much sugar as it is their nature to do, and that it is only during the last part of the maturing process that they acquire this most desirable ingredient; for grapes are fit to eat long before they are ripe enough for wine. It is very desirable to select good, dry and pleasant weather for the vintage, and to have gatherers in sufficient number to gather in one day, or two at the most, all the grapes that are to be made into wine at one time. The reason of this is obvious; for fermentation begins as soon as they are together in quantity, and before they are mashed; so that any that had been gathered several days before, if mixed with the last, will be in different stages of fermentation, which may disturb the process in some degree. In gathering the grapes great attention must be given to the gatherers, that they pick out all such berries as may be rotten and all the green ones, and that they do not unnecessarily bruise them. Common scissors with both points sharp, are the most convenient implement to gather the grapes with, and take out the bad ones. The stems should be cut short and each bunch carefully deposited in baskets or other suitable and convenient vessels. These are occasionally emptied by the carriers into large tubs and, carried immediately into the vat, if near enough, if not, into hogsheads, with one head out and set up in a wagon to receive the grapes, and thence, when full, carried to the vat. This is a large vessel made of oak, very strong, and of a size proportioned to the quantity of grapes to be made into wine at one time, and the larger it is the better; for it is believed that the fermenting process goes on the better, the greater the quantity of matter in fermentation. The grapes are then to be mashed. There are various methods of doing this. The most common one is for men to get into the vat with their naked feet and legs, and trample them down until they suppose every berry is bruised. A better and neater way is to put a small quantity of the grapes at a time into a box placed on pieces of timber over the vat, the bottom and sides of the box being perforated with holes. A man then gets in with a pair of wooden shoes

used only for this purpose, and when the contents are sufficiently bruised, one of the sides, which is made to slide in and out, is taken out and the mashed grapes are shoved into the vat, when another supply of grapes is put in, and so on till the whole of it is done. A better way still, which I never have seen in use or ever heard of, until I had contrived it for my own convenience, but which I have since seen delineated and recommended in Thiebault de Bernaud's Manual, &c. It is two rollers with each a crank. These rollers are about two feet long, more or less as may be needed, and about six or seven inches in diameter. They are so placed on a frame as to be easily brought closer or farther apart, so as to crush the berries without cracking the seeds; to prevent which bad effect, I selected a very soft wood, the tupelo, so that the seeds would rather make an impression on the rollers than the latter on them, unless, indeed, they were much too close together. I found the proper distance to be about a full eighth of an inch. A hopper is so fixed above them as to bring the grapes readily to pass between the rollers. These are turned by two children, and it is so easy a work for them, that they must be continually checked for turning too fast. It is almost incredible what quantity of grapes can be most completely mashed in a short time, by means of this machine. It performs its operation certainly better and more thoroughly than can be done, I think, by any other means. It is most surprising that so obvious, simple and convenient a contrivance, should not have been in use generally in Europe for centuries past! At this stage of the process, the quantity of saccharine matter contained in the juice is to be ascertained; for it would be a very useless and uncertain operation, if the fermentation had gone on for some time. This may be done by trying whether an egg will float in it, so as to have a small portion of it out of the liquid. Or by an areometer, which is the instrument I use. That of Beaumé for syrup, or that for salts, is the suitable one. The juice of my Madeira grape raises the instrument usually about 10° and it requires about half a pound of good sugar per gallon, supposed to be in the vat, to raise it to 13° or 14°, which is fully enough to make a good and durable wine. Some grapes, the Lenoir, for instance, are richer, and the latter sometimes raises the instrument to 13° full; so that it is sufficiently rich to make a good wine without the addition of any sugar. After the whole has been well stirred in the vat, so as to have completely mixed the sugar with the mashed grapes, some of the must is again taken out and tried with the egg or the areometer, when sugar is again added, if insufficient. If otherwise, the vat is covered with boards and a cloth, and the whole suffered to ferment for one, two, three or more days, according to the temperature and the object in view, and the activity of the fermentation. As the weather is usually hot here at the season of vintage, I find usually twenty-four to thirty-six hours sufficient, particularly as the object is not to obtain a highly colored wine, and also for fear a longer fermentation with the *marc* would extract from it, that is, from the skins, seeds and stems, too much tannin, which might make the wine too astringent, which though very wholesome, is not generally so palatable as a less degree of it. During the time of fermentation in the vat, its contents should be stirred several times, and the top, which

has been raised, is to be depressed down into the more liquid part at the bottom. This is deemed necessary, lest the top having immediate access to the air, should become too acid and impair the quality of the wine. I usually stir and push it down twice in about twenty-four hours. The vat being provided with a large cock, two or three inches above its bottom, this serves to draw off all the liquor that will run out without pressure, and it is at once put into the casks ready to receive it. The remaining contents of the vat are then carried to the press to extract all the juice, and this last is either mixed with the former, or is put into separate vessels; for that from the press is more astringent than that which has run freely from the vat. When only a small quantity of wine is made, it is not usual to keep these two qualities separate, as it gives a great deal of additional trouble to have two sets of vessels, the contents of which are to be kept always separate. The casks into which this must is put, (for it is not yet wine,) are not filled by about three or four inches, according to their sizes. The object of this is to allow room for the continued fermentation, and prevent loss by the must running over. The bung holes are then covered by two or three vine leaves and loaded with a double handful of moistened sand. Some, instead of this, use small bags full of sand. Either act as a valve that will rise if the fermentation is violent, and suffer carbonic acid gas to escape. It is yet the opinion of some persons that the casks should be filled up, so that the rising of the froth and other matter excited by the fermentation, should run out of the cask; but the only difference that I ever could find is, that in the latter case, some of the wine is lost with the foam, &c.: whereas, by the former process, it settles to the bottom and adds that much to the lees. The fermentation will go on for two or three weeks, decreasing gradually in energy, till at last it is insensible, and is no longer heard by applying the ear to the cask. When this is the case, the casks are to be filled up to within about an inch of the top, and the bung driven in close. In this state great care is to be taken, and the casks visited at first often, about twice a day, lest the fermentation increasing should burst the cask or produce some leaks. The better to guard against this, a gimlet hole is made within an inch or two of the bung, and stopped with a peg that can be loosened and taken out for a moment occasionally, at the frequent visits to the casks. The taking out of this peg for a minute allows the escape of the gas, and precludes all danger. The whole is finally left undisturbed for six or eight weeks, except that the casks are often filled up; for as the fermentation increases the bulk of the liquor, the vessel, which should be kept full, must be filled up when it has subsided. After this, taking advantage of a clear cold day, the wine is to be drawn off its first lees, and put into other casks which must have undergone a due preparation to receive it. The fumigation with a sulphur match is by no means to be omitted here; for it is then more necessary than at first. Its object is, besides purifying the air contained in the cask, to prevent an undue renewal of the fermentation, to which the wine is liable after being stirred, and thus exposed to the atmospheric air. Until this period the must, in its progress to becoming wine, is very harsh and unpalatable, and, to a person not accustomed to it, it would seem that it has

spoiled, and never can make good wine. It has now, however, become very pleasant, palatable and wholesome, although its fermentation is not fully completed. It becomes again, at certain periods, as if about to spoil and turn to vinegar; but the owner, or his substitute, need not be alarmed; for it is only produced by a slight renewal of fermentation, which though not otherwise perceptible, has in reality produced this effect, which will have disappeared in a few days, or a week or two, with an evident improvement of the wine. These periods of renewed fermentation are said to be, first when the sap rises in the vine in the spring, second when it is in bloom, and then, when the fruit is acquiring its maturity. Although these are the observations of illiterate men, who attribute to these periodical circumstances of the vine the renewed fermentation of the wine, the fact is true, though the cause must be looked for elsewhere; probably that which affects the vine and that which affects the wine, are the same changes in the temperature of the atmosphere, together with the state of the wine.

The above described manner of making wine is the general practice founded on experience from time immemorial. (I must except the addition of sugar, which is not done in Europe, except by very few; and this is probably the reason that their wines vary more in quality, according to the seasons, than would otherwise be the case.) There are, however, many alterations, probably improvements, for the purpose of varying the qualities and properties of the wine. If a highly colored wine is desired, and this is much regarded in France, it is suffered to ferment longer in the vat. The coloring matter is obtained from skins by fermentation, which also extracts from the stems and seeds an astringent principle, which is very manifest in all red wines, and strongly marked in port. This astringency is certainly one of the good qualities of wine, when not in excess. I believe, that for one cask of white wine that is made in France, one thousand of red is produced. Some of the white wines are, however, more pleasant to delicate palates, (I mean generally, for there are many exceptions,) and in some cases, are as wholesome, though their properties are different. The best white wines, if we except a very few of the choicest kinds, are probably those made of black grapes, of which champagne is the most noted. In making these wines, great precautions are necessary to prevent their acquiring any degree of color from the skin. It is according to the process of making champagne, that I make a white wine of my Madeira grape, which is known to a few gentlemen in Baltimore, and to many in South Carolina. The process is as follows: the grapes being fully ripe, and the weather favorable, the gathering commences as early as possible, by day break if practicable, for it ought to be discontinued by the middle of the day, unless the sky is cloudy, for fear the heat of the sun should tinge the juice. They are gathered and picked with uncommon care, so as not to bruise them and leave no rotten berries in the bunches, the finest of which are selected. As fast as the baskets of the gatherers are filled, they are very carefully and gently emptied into the press, if near enough, if not, into tubs to be carried to it by men; taking the utmost precaution lest they should be bruised by either removal, for fear the fermentation should commence and

color the must. The grapes are gently arranged by hand in the press, and when it is full, they are pressed down, though not very hard, without their having been previously mashed. The juice thus obtained, has at this time a little color; but this is deposited in the bottom with the lees. It is then put into casks, and treated afterwards in the same manner, as according to the other process above described. Before it is put into the casks, the strength of the must should be tried, and such sugar added as may be needed. In order to have the wine effervesce, it must be carefully excluded from the air as much as practicable, the vessels kept full, bunged very close, and after it has been drawn from its first lees, it should be twice fined with the white of eggs, or isinglass, at short intervals of time, so as to be able to bottle it in March. Very strong bottles should be selected for this purpose; the champagne ones being made for the express purpose, are probably the best. The corks should be of the very best quality, and fastened down with wire, or tied over with bladder, which answers both purposes of wire and wax.

Wine made in this manner is necessarily more costly than according to the other, for three reasons:—much more care and attention are required during the process; it is made of the ripest and most perfect juice; and lastly, because only a portion of it (about one-half) can be obtained by this process; for, on unscrewing the press, it is found that only the ripest berries are broken; all the others, though ripe enough for the usual purpose of making wine, are left entire. The contents of the press have then to be passed through the rollers, or to be otherwise mashed, and put into the vat with the rest of the crop. This wine, when made with all due care, is nearly colorless, and, whether it is made to effervesce, as champagne, or not, is a very delicate and pleasant liquor, not having any of the astringency of colored wines. I have reasons to believe, that under certain circumstances, a small quantity of sugar-candy, about half an ounce per bottle, is added at the time of bottling it. This may add to its briskness, as it does to its taste. It is surprising to observe the difference between this colorless wine and the other made at the same time and with the same grape, the latter being fermented in the vat for twenty-four to thirty-six hours, more or less, as circumstances may require. Those which I make with my Madeira, which is a very suitable grape for the purpose, have apparently no points of resemblance.

Rather than interrupt the description of the usual process of making wine, I have not inserted in its proper place, a subject on which writers as well as practical men, do not yet agree. It is whether it is best to separate the berries from the stems, or to leave these and ferment the whole together. It is very probable that in this, as on most subjects of difference, both sides are right in particular circumstances. The advocates for stemming the grape, say, that by this operation, the wine is more delicate, and has none of the roughness imparted to it by the stems in the other mode of proceeding, and that the skins and seeds are sufficient to give it a due degree of astringency. The other party say, that the wine fermented with the stems is much more durable, and that its roughness disappears in a great degree as the wine acquires age, and that the greater quantity of

tannin which it has acquired from the stems, and which produces its astringency, renders it a more tonic and wholesome wine, as well as a more durable one. Both are certainly correct to a certain extent, and where the grapes acquire a sufficient richness to make a desirable wine without the stems, as is generally the case in warm countries, it is certainly more pleasant to the taste, and where the grapes are deficient, the stems are properly left to add the very desirable quality of durability to it. When, therefore, it is desirable to stem the grapes, it is well to be informed of the speediest manner of doing it. Of the various ways which I have read of and tried, the following appears to me entitled to the preference. The grapes are thrown into a box, the bottom of which is made of canes, or narrow strips of wood, crossing each other so as to leave open squares of about three-fourths of an inch. This box being placed over a small vat or large tub, hogshhead, or the like, the grapes are rubbed by hand hard against the bottom, by which means the berries fall through and the stems being well shaken, are thrown into an empty vessel ready to receive them. These may be afterwards mashed and help to fill the vinegar cask. Some considerable time will be saved, when the grapes are stemmed, by placing the riddle or stemming box over the hopper of the rollers; for the berries, though a good deal mashed and bruised by the operation of stemming, are not sufficiently so. This operation adds a great deal to the time and trouble, at a season when both are precious.

It will perhaps be objected to my process of making wine, that, as I add some sugar to it, it is not the pure juice of the grape. True; but if the fruit is not sufficiently rich in saccharine matter, it seems to me allowable to supply the deficiency. It has been observed before, that the grapes of old vines are richer than those of young ones. The deficiency of sugar is therefore correcting itself gradually every year. Besides this, some seasons being very wet and cool, do not produce as rich a fruit as more dry and hot ones do; and it is well to know how to remedy the defect. Some persons recommend to supply the deficiency by the addition of brandy, which, I think, is objectionable—unless, perhaps, it be added before fermentation, when it is possible a chemical mixture may be the consequence; whereas, if it be added after the fermentation is over, the mixture is only mechanical. Whether it is prejudice in me or not, I think it is always injurious to the wine to add brandy to it, unless it be done at the beginning of the process; and a great deal of it is probably evaporated during the fermentation. My little experience tells me, that spirits, either mixed with water or with wine, attack the nerves, and are productive of many disastrous consequences to health, destroying the tone of the stomach, &c. I have always been of opinion that brandy is never added to wine in France, unless it be to prepare it and make it suitable for certain markets abroad. I never have read any book, or seen any person having any knowledge on the subject, but denied stoutly such addition being made for home consumption, until very lately, when I read in the "Manual of the Wine Drinker," (a new book,) that, in the neighborhood of Bordeaux, a certain kind of spirit, called "trois-six," is put into the wine in specified quantities; and about the same time I saw a lady, who is the owner of vineyards in that country,

who avowed the same thing. What "trois-six" is, it is not possible for me to say from the name; but I presume it is alcohol, of a certain degree of strength. Be this as it may, I am satisfied it is only a recent practice in France, and I doubt its extension beyond the country where it is said to be adopted. Whether the practice is good or bad, I have no experience to determine; but it is very possible that the preference is given in that country to spirit over sugar, because the latter is much dearer than the former, in proportion to its effect.

There are various other processes of making wines of particular qualities, and in certain districts; but, as I am not practically acquainted with them, I shall only notice them very briefly. In places where they wish to make a strong wine, without the addition of either sugar or brandy, they reduce the must by boiling,—evaporating a quantity of its water,—whereby the proportion of the saccharine matter to the liquor is increased. Others attain the same object by laying the very ripe grapes on an extensive floor on straw; so that they dry almost to raisins. The great objection to either of these modes of proceeding, in a country of beginners, is, that the quantity of wine made is thereby considerably diminished, and we naturally enough aim at quantity as well as quality, and it appears to me more economical, to supply the deficiency of sugar, by sugar itself, than to do it by evaporating a part of the liquor.

There is another subject, intimately connected with wine making, which I have not yet noticed. It is the cellar. A good cellar—one calculated to keep light and delicate wines—ought to be so deep that no change of temperature is experienced in it throughout the year. It should also be rather dry than damp; for too much moisture is injurious to the casks. If I had such a cellar, I could easily make and keep wine without sugar; but in such as we have here,—dug only one, two or three feet deep, and merely covered by the floor of the house over it—such wine would probably be too often affected by the changes of temperature, to resist long. I have seen champagne upwards of thirty years old, that had been kept in a cellar at least twenty-five feet deep, and it was as brisk as if it had only been two or three years old. We have then, as yet, no chance of getting accustomed to the use of very light wines, which are gentle in their effects, tonic, exhilarating, and not producing intoxication, unless drank to a very great excess; and even then, the consequences of intoxication, by such wine, are not as injurious as that produced by the stronger ones. If, however, intoxication is the object, it is much more readily obtained by brandy itself, without resorting to the farce of drinking it mixed with wine and calling it exclusively by the latter name.

Where they have good and deep cellars, it is not usual to put the wine into them before it has been drawn off its first lees; but it is kept until that time in what is called a "celier," which corresponds more with our cellars here. A good cellar, then, should be twenty-five or thirty feet below the surface of the ground, vaulted with stone or brick, and have apertures leading to the external air. Wine, in good casks well filled, or still better, in good bottles filled to very near the cork—about three-quarters of an inch at most—well corked and waxed, and kept in a cellar where

there is no light, or any change of temperature, must, if it were sound when put in, remain sound for many years, though it be not a very strong wine.

ON THE CAUSES OF FAILURE IN VINE CULTURE AND WINE MAKING.

To the Editor of the Farmers' Register.

Columbia, S. C., November 15th, 1834.

In the No. for the present month of the Farmers' Register, you request that light may be afforded on the causes that have hitherto operated against a complete success in the culture of the vine, in an extended or more general way; for, as you truly say, "the best proof has not yet been furnished by the successful and profitable general results of the labors of any one individual." As you honor me especially with this request, I must do my best efforts to do what seems to me very difficult, after the many disappointments which I have myself suffered, and witnessed in others. Great, however, as these disappointments have been, they have chiefly been so as compared with our unreasonable expectation; but not so as to deter the well wisher to so good a cause, from persevering in his efforts. It is true that, as you say, "there is no doubt as to our being able to raise delicious grapes, and sometimes abundant crops of them—and also that from them excellent wine has often been made." Wherever good grapes can be raised, it is indisputable that wine can be made, and its quality will depend on the soil, culture, kinds of grape, and particularly on the skill of the person that makes it. Although little has, as yet, been made for sale in this country, some has been sent to a considerable distance, which was so well relished as to induce an order for a quantity three times greater than the first sent, and the order has been complied with. Besides this, several gentlemen have been now for some years in the practice of making wine fully sufficient for the consumption of their household. All this is worthy of attention—but yet we cannot deny that it has not yet been made a profitable object of culture, and the causes of failure are probably many, and one in particular, impossible to correct: I mean the irregularity of our climate. Among the others may be reckoned, that the experiments hitherto made have been on too large a scale, which precluded the multiplying of them as much as they should have been. I know a gentleman who, before he had any experience, began with twenty to thirty acres, and he has now about fifty or more acres in cultivation. Experiments on such a subject are very expensive, on account of the length of the time required to complete them, by which the patience of the experimenter is often exhausted before he could have calculated on a result; but, if the trial has been made on a large scale, the expense attending it may also have frequently warned the imprudent, though patriotic zealot, that by seeking thus for wine, he may lose his bread.

In order to have reasonable hopes of success in such an enterprise, every point of difficulty is to be considered; and in a country where such a culture is first attempted, the points to be ascertained are many—first, as to soil, exposition, and climate. It is very evident, that a satisfactory

result to this inquiry cannot be obtained before the experiment has been carried on in various sites, soils, and expositions, and at considerable distances from each other. The particular kinds of grapes suitable for the different soils and situations, is also a subject of no trifling difficulties, and the solving of them requires, of course, many and very carefully made experiments. The effect of the insufficiency of experiments on this particular subject, has been a hasty conclusion, that foreign grapes will not do in this country, thereby discarding at one fell sweep, a whole, and probably the best families of the vine, from which success should have reasonably been expected. I do not intend, by this, to intimate that we cannot hope for success from our native vines; for I believe that many are very valuable—and especially, great expectations may be formed from vines raised from the seed of native vines, impregnated with good foreign ones; but the fault usually found with the imported vines, is also frequently found (in unsuitable situations) with some of the native ones; some of which will rot, decay, or otherwise fail in the same manner as those imported. By thus rejecting, without sufficient cause, all the imported vines, we give up the chance of producing those fine and elegant wines, for which foreign countries, and particularly Europe, are so celebrated. To take a detail view of these numerous experiments, is almost certain to produce an abandonment of the difficult task; for each of them requires many years to afford a satisfactory result, and several of the trials can only be made one after the other. It seems to follow, from all this, that these experiments are above the means and perseverance of men in their individual capacities, unless possessed of great wealth, and an unchangeable determination to follow them on to a successful termination. I have long come to the conclusion, that experiments of this nature should be undertaken at the expense, and under the protection of government, or of large and wealthy patriotic associations, capable and willing to pay competent men to carry them on in the various soils and situations of the country; and, with sufficient means, they (or most of them) may be undertaken simultaneously, by which, time and expense would be greatly economised. First ascertain that a particular culture is desirable and its advantages great, (and those from the culture of the vine are incalculable, in moral, political, and financial points of view,) and, after this, why hesitate to adopt adequate means of success?

I know it will be said, that it is contrary to the spirit of our governments and institutions, to undertake any thing of this sort at the public expense, and that the enterprise of individuals will soon effect it, if it promises profit to them. It appears to me, that the expense and care of an enterprise should be incurred by those who are to derive the advantages—and the country is to derive them; for is it not a public benefit, that the citizens should be temperate, industrious, moral, and the country itself increase in a denser and happy population? It cannot be doubted at this day, that drunkenness is comparatively unknown in wine countries, and that the cottage of the vine cultivator is the abode of industry—therefore of honesty and happiness; that each individual can cultivate only a limited extent of vineyard, hence a dense population is the necessary consequence. Is there any thing more desirable in any country, and particularly in

our middle and southern Atlantic States than a numerous population of honest, industrious and sober people? If it be not one of the principal duties of governments to aim at producing such a state of things, in the name of common sense, what were they instituted for? Were they formed merely to pilfer, worry, vex, render criminal, and punish poor simple man? If such be their objects, give me anarchy and the savage state.

Taking things as they are, however, may we not succeed in some degree in cultivating the vine to advantage? Time and perseverance will undoubtedly effect what might have been done by more sure and speedy means; and let us endeavor to correct our errors and proceed as well as we may in our circumstances. On examining carefully this fruitful subject, we find that, in some localities, several of the varieties of the vine which have been cultivated here, not only succeed well, but very seldom fail of producing a plentiful crop. Whether this be due to soil, exposition, or other cause, we ought to be satisfied that whatever may be, and is actually done on a small scale, cannot be absolutely impossible on any scale, soil, &c., being suitable. As for the cost necessary to obtain such a result, (if it can be obtained by any means in our power,) if success could be once tolerably certain, it would be of no consequence; for what could be too expensive that would produce from \$500 to \$1,500 per acre? We must next consider whether the object is worthy of the effort. Not taking now in the account the great and public advantages, or the possible great pecuniary profits, merely hinted at above, some of the individual advantages may be detailed. A farmer, a country gentleman, or even one residing in a town as a professional man, or a man of wealth retired from business, may cultivate, in his leisure moments, by himself and his house servants, from one-eighth of an acre to one or two acres of vines, according to his means, his industry and his zeal; and from this source of healthful, interesting, and most innocent amusement, he will obtain in usual seasons, a most abundant supply of a wholesome beverage, a wine which he will know to be pure and unadulterated. He will be able to make at least two kinds of wine from the same grapes, and gradually improve in the qualities of each as he acquires experience in the making of them. These wines will excite in him an honest pride in regaling his friends with the product of his own industry, and protract and invigorate that health which he will have established by the cultivation of his vines. He will form in his family and domestics, habits of industry, useful exercise, sobriety, and consequent happiness, and his posterity will bless his memory.

As you seem disposed, Mr. Editor, to republish one or more pieces of mine, formerly published in the American Farmer, it may not be unnecessary to say a word concerning the discrepancies that seem to exist between my present observations and some in former pieces. Not that I care for what is usually understood by consistency, for I sincerely wish to be only consistent in my attempt at stating the truth, and in doing whatever little good I may have in my power. It will be found in some of my former writings, that I reject the idea of any very great difficulty attending the culture of the vine; and, notwithstanding all that I may have said above, I still say the same thing. The knowledge of the thing, trifling though it may be,

must be had; but having the proper kind of vines planted in a suitable soil, the difficulties all vanish, or none remain but such as any man with a little practice and a common understanding, can usually overcome.

The instability of our climate is undoubtedly a great obstacle to our cultivating the vine in this country, in any situation indiscriminately. The last season is a very striking example of this. We had here, frost as late as the 17th of May,—much later than I had ever known it. The weather continued cold sometime longer; and when the temperature changed, it rose at once, or rather in the course of a few days, to almost the highest degree to which it usually rises in the hotter parts of our summer. Although that very late frost was not, in many places, sufficiently severe to kill the young shoots of the vine, yet it must have checked vegetation very greatly: and it seemed to me to have produced a sort of paralysis, if plants are ever subject to such a disease. The quantity of fruit thrown out by the vines was very great, and there never was a prospect of a greater crop. It seems however, that the vigor of the vines was insufficient to nourish the fruit; and this high degree of temperature producing a great exhaustion of moisture from them, greater than their capability to sustain the due equilibrium, the grapes withered and perished in a shorter time, and to an extent never known to me before. We have usually, in the first great heat in June, a period of rot or decay like this; but never so destructive, and always leaving a quantity sufficient to have such a second period of rot, and still leave enough for a tolerably good crop. I have several times, I may say, ordinarily, after two such periods, obtained from my vines in my garden, at the rate of from one thousand to one thousand five hundred gallons of wine per acre, on about the sixth part of an acre. The vines at my farm being much more exposed and in still more sandy soil, have never done as well as this; but it is an undoubted fact that the wine produced from the more sandy and poorer soil of my farm is of a superior quality to that made from my garden.

It is worthy of notice, that wherever vines are protected by houses, &c., they are proportionably free from the effects of these periods of rot or decay. Situations, therefore, sheltered by mountains, hills, &c., are likely to prove the most advantageous for the vine, particularly where the soil contains calcareous matter, or is otherwise suited.

How far these views of mine may be correct, it is very difficult to say; for, I have had generally, very strong reasons for attributing the rot to the great rains which we usually have in the latter part of June, after a long and severe drought. The operations of nature require a very close and accurate observer, who has time, and knowledge to bring to his assistance, or else the results of his observations will scarcely be any thing but a chapter of contradictions.

You ask me, sir, what is the origin of that vine which is called "Herbemont's Madeira." It is a vine which I found cultivated by the name of "Madeira" in this place when I first came to it. I had for a long time, reasons to believe it a native vine; but a gentleman of Georgia, to whom the culture of the vine is very greatly indebted, (Mr. Thomas McCall,) assures me that he knew it to have been imported from France. It is so vigorous in its

growth, so well inured to the climate; besides which, I had received it several times from different quarters as a native, that I was warranted in my supposition; but I have no doubt now of its being an imported one.

N. HERBEMONT.

ON OBTAINING NEW AND IMPROVED VARIETIES OF GRAIN BY CROSSING.

To the Editor of the Farmers' Register.

In sending my monied contribution to the Farmers' Register, which I am sure you will consider the best evidence that I could offer of its merits, I beg leave, very briefly, to suggest a few thoughts on the subject of seed corn. I believe, then, that there is but one genus of wheat, and one of maize, or Indian corn—and that all the varieties of either, known to me, are the results of climate, culture, seasons, soil, &c. &c.—and I believe, that by the agency of man, these results may be still further diversified, and made subservient to his good. By the agency of man, in the simple act of selecting from existing varieties of wheat, the agricultural community have been furnished with that called *the Lawler*, generally admitted to be less liable to injury by the Hessian fly, than any other known variety—and from the fact, as I believe, that its lower leaves, commonly called the *boot*, do not adhere closely to the stalk; but like the same leaves on rye, fade as the stalk begins to form, leaving any deposit of eggs which would have been sustained to the injury of the stalk, by a gentle pressure of the boot, to perish for want of that pressure. But whilst the Lawler wheat has the admitted quality of being less liable to injury by the fly than any other known variety, it is cultivated reluctantly, from a belief that it is less productive in grain, than some other varieties. Now reasoning from analogy, and not doubting the fact, that by means of judicious crosses alone, the English breeders of cattle have been able to create new species of that stock, combining the best qualities of several varieties—why not expect like results from like means, if made to operate on wheat or Indian corn? For instance, we desire a kind of wheat that shall unite the qualities, say of the blue stem and Lawler—is it not very reasonable to suppose, that from the seed of these varieties promiscuously grown in the same field, a stalk would be found, here and there, exhibiting the loose boot of the Lawler, and the many grained head of the blue stem? If yea, my theory for creating a new variety of wheat is established—and the world is welcome to it, without a charge of *patent fees*. But that which, in my own opinion, is only probable as to wheat, I have no doubt is true in relation to Indian corn, for every body knows (or may know by a single experiment) that any two or more varieties of Indian corn, when promiscuously grown in the same field, mix freely and extensively, combining in the product the qualities of the parent seed, more or less equally as it may happen: thus affording the planter of this invaluable grain, by the easiest means imaginable, an opportunity of fashioning his corn to his own fancy. And yet how few for that consideration, or the still greater of adding to the contents of their crib or their purse, have ever made an effort to improve their corn? As exceptions to a negligence so general, I consider it my

duty to say, that there are two gentlemen in this county who have made very laudable efforts to improve their corn by means of a careful annual selection of seed. The fancy of one led him to desire that *his corn* should excel in weight, and making his selections with that view, but only from his own crops, has brought it, as I am well assured, to the unusual standard of upwards of sixty pounds to the bushel, being about five pounds heavier than mine, which I would reluctantly have rated below the average of the county. I have compared this improved corn with my own, because I believe that both are from the same variety, as it existed twenty years ago, proving most conclusively, what may be done, if we would only *try* to do.

The other gentleman whose efforts to improve his corn are so commendable, seems to have experimented more with a view to quantity by measure than by pounds; and instead of selecting for seed, such ears as he would like his next crop to have, prefers taking the upper ear of stalks bearing two or more ears—and he appears very confident, that this mode of selecting seed, continued for, say the last twenty years, has given him a species of corn, which hardly ever fails to have two ears to the stalk—and that his crops have been greatly increased since he adopted it for cultivation.

Rockbridge, Nov. 18th, 1834.

Extract from the journal of the Agricultural Society of King William and King and Queen.

Resolved, That Mr. William Boulware be requested to furnish a copy of his address to this meeting for publication.

THOMAS HAYNES, *Secretary*.

A SKETCH OF AN ADDRESS DELIVERED BEFORE A MEETING, CONVENED AT AYLETT'S, KING WILLIAM COUNTY, FOR THE PURPOSE OF FORMING AN AGRICULTURAL SOCIETY.

By WILLIAM BOULWARE.

An interesting subject has called us together. Among all the arts, sciences, and professions of man, there is none so comprehensive in its influence, and so universal in its interest as agriculture. All the citizens of a state are blessed in its prosperity, and all languish and suffer in its adversity. It is the basis on which repose all other arts; and, indeed, civilization itself; for without it man would be a wandering savage, roaming the forests in search of an uncertain and scanty subsistence. The Egyptians appreciated so highly its benefits, that they ascribed the invention to one of their Deities, and in the excess of their gratitude worshipped the ox for his services in the cultivation of the soil. The nations of antiquity soon learned to estimate the art of agriculture, and in many respects Virginians of the 19th century have cause to blush at their inferiority. In the purest period of the Roman Republic, to be called "an industrious and judicious husbandman," was esteemed the highest encomium that could be given an illustrious character. The most distinguished citizens devoted their talents and labor to the cultivation of the soil, and the improvement of the mode of husbandry. "M. Cato, the censor, who was

celebrated as orator, statesman, and general, having conquered nations and governed provinces, derived the highest and most durable honors from having written a voluminous work on agriculture." Virgil has lent his genius to the same topic, and embodied in the flowing harmony of his numbers, and the glowing beauties of his versification, the precepts and the pleasures of the farmer's life. Pliny, Varro, and many other Romans of equal celebrity, composed treatises on the same subject, and were held in high estimation as public benefactors, for contributing their aid to the improvement of the tillage of their country. The Greeks, also, devoted as they were to politics, commerce, and conquest, did not neglect the business of agriculture, but gave a portion of that genius which had illuminated so many other subjects to an elucidation of the principles of rural economy. Hesiod, Xenophon, and others, have written on this subject. Other nations of ancient times held this art in high esteem, and contributed to accelerate its progress. The Carthaginians carried it to a high state of perfection for the age in which they lived. In modern times, the inhabitants of other countries and other states of this confederacy, have done much to advance it. Philanthropists have expended their efforts on its improvement—philosophers have investigated and speculated upon its theory and practice, and statesmen and states have contributed substantial aid to its advancement. An employment which occupies seven-eighths of the population of all civilized communities, which is the source of occupation, and the paymaster of all other trades and professions, is certainly one well worthy the investigation of the scientific, the patronage of the benevolent and patriotic, and the protection and bounty of governments. The economists of the 18th century, perceiving its superior importance in a state, and the intimate connection and dependence on it of all other departments of industry, were led erroneously to consider that agriculturists were the only producers, and the rest of mankind mere consumers. In the commencement of this art the principles of science have been applied with much advantage. Chemistry has poured a flood of light on the whole circle of agricultural topics. By it, much that was doubtful has been decided; much that is new and valuable has been added, and the means are afforded by chemical analysis, of establishing principles and practice as sure and determinate in agriculture, as in the science of mathematics, or any other. It has torn down the pillars that sustained the fabrics of many systems built up amid darkness and ignorance, and in their place has afforded the instruments for rearing a science on a basis firm as adamant, and lasting as truth. By an analysis of the soil, whatever is noxious may be detected; whatever constituent is wanting that is necessary to the crops proposed to be grown, may be ascertained, and thus the character of land and its value be decided. A specimen of a soil of good appearance but remarkable sterility, was placed in the hands of Sir H. Davy for his examination. Upon a chemical analysis he detected sulphate of iron. This he knew to be unfavorable to vegetation, and recognized it immediately as the source of the sterility. The remedy was obvious to the chemist—a top-dressing of lime, which converted the poisonous principle into a manure. The lime was applied, the sulphate of iron was destroyed,

for the sulphuric acid which was in combination with the iron, on account of its greater affinity for the lime, united with the lime and produced sulphate of lime, which is the plaster of Paris of commerce. Thus was the poison of the soil rendered a fertilizing and valuable constituent, and the barren land became very productive. Again, it is at this time a controverted point in our section of country, whether manures would better be applied before decomposition, or thrown out and exposed to suffer a thorough putrefaction. My impression is, that a majority have adopted the latter opinion. The same distinguished chemist has shown, to a certainty, that in the process of fermentation and decay, there is a loss of one-half or more in weight, and an escape of a large quantity of carbonic acid and ammonia, which are both very nutritious to plants. The odors which escape from our manure heaps, and assail and disgust our olfactories and contaminate our atmosphere, would, if preserved, contribute to the sustenance of crops and the subsistence of man. But it has been said that experiment has decided that a crop that has received rotted manure will be more abundant. This may be true as to the first crop, and yet the permanent utility of the manure be diminished one-half and more. And if there be a necessity for fine rotted manure, the loss may be prevented by throwing on the heaps previous to fermentation, earth to absorb and preserve the fertilizing principles that would otherwise be evaporated. Thus the investigations of the chemist assist the agriculturist. But with us, in Virginia, for the most part, but little application has been made of science in the cultivation of the soil. Heretofore, improvements that have been introduced, and discoveries that have been made of practical utility elsewhere, have been received by us with indifference and neglect. Indeed, with many, a prejudice seems to exist against every thing of the kind. Changes are denounced as innovations, and the cry of theory is sufficient to overthrow the most important fact. Theory is the bugbear that frights their imagination, and woe is pronounced on the man who is the victim. Singular as it may seem, such individuals are usually the most persevering, devoted, and inveterate theorists. So enamored are they of those of their own conception, that they give no ear to those of others. For all the phenomena which they witness, they assign abundant causes, and they are fluent on the relations which facts bear to each other. The misfortune is, that often there is no connection between their causes and their phenomena, and no existence for the relations of their facts, save in their own minds. When this is the case, an erroneous practice is the inevitable result. This has had its influence, combined with many other causes, in producing the present state of our agriculture. Such is the impoverishment of many farms under the system of tillage that has prevailed, that they will not restore the husbandman the expense of cultivation. It has been estimated, and I am inclined to think, correctly, that the cost of cultivation averages in Virginia, five dollars per acre. There is much land in our vicinity, and that too in cultivation, which does not yield products that would sell for half this sum. But if it brought the full amount, that only pays the cost of labor, and the wear and tear of implements; and the interest upon the capital invested in the land,

is lost. There are very many estates of which the produce of the soils falls *far short* of rendering the owners a legal interest on the whole investments, and the only means of sustaining so unprofitable a business, is to raise negroes for the southern market.

Blessed with a soil naturally productive, and well adapted to a great variety of crops, in a climate mild and genial, midway between the "drifting snows and driving sleets" of the North, and the poisonous exhalations and burning suns of the South, we have nothing to accuse but our own waywardness and prodigality in squandering the bounties with which a kind providence had enriched us. While other countries have been improving their lands, and increasing their products, ours has been the downward course of deterioration and destruction. While England has been doubling her products every twenty-five years—while New England, and most of the States north of us, have been very rapidly augmenting theirs, we have continued in the habits of our fathers, rejecting improvements, and have been going on to destroy the fertility that remained after so long a period of exhaustion. The relative diminution of our exports, the slow increase of our population, compared with that of many other States; nay, the absolute decrease in fourteen counties east of the Blue Ridge, the rapid tide of emigration that is making out from our confines, all attest the disease that is wasting the energies of Virginia, and blighting her once fair prospects. While her population is yet sparse, her citizens flee from her—the ties of kindred, the endearments of home, all the tender associations that cling round the place of their nativity, cannot bind them, for their wasted fields yield them a poor subsistence. They wind their way to the far distant South and West, and take refuge on soils not yet marred and destroyed by the reckless hand of man. Mr. Jefferson in his Notes, written in 1782, predicted that in 1835, our population would be 2,270,000. By the census of 1830, we have fallen short a million of it. At that time Virginia was the first State in the confederacy—first in wealth, strength, and population. She has now fallen to be third, and in a short time will probably be fourth. But need we wonder at this result, when we contemplate the system of husbandry that has been so long practised among us? Ours has been for the most part, a regular succession of clearing and killing, and clearing and killing again, until there is but little left of the original forest, and we have nearly realized the fable of killing the goose to get the golden egg. We have pursued the process of depletion and exhaustion to that extreme, that the patient must expire unless there is a change of practice. Intelligent travellers have already described a large portion of that section of the State lying between the head of tide-water and the sea shore, as barren wastes, affording a bare subsistence to a thin and scattered people. But I rejoice that the energies of our soil are not exhausted, though lamentably worsted and enfeebled. I believe that with judicious treatment, the "*vis medicatrix nature*" will resuscitate our suffering earth, and restore her to her gay and brightest existence. The original vigor of her constitution will facilitate the efforts of the physician. In many cases there are reposing in the bosom of our land, inexhaustible stores of fertility, laid up, it

would seem, against this hour of need, and we have only to apply them and receive a rich reward. Upon other farms not favored with calcareous treasures, there are almost universally, other sources of enrichment, which preclude doubt and despair as to the possibility of recovery. I cherish the hope that a change has already commenced, which portends much good to Virginia. The establishment of an agricultural paper among us, edited with great ability, well sustained by contributors, and supported by an extensive patronage, is a most favorable omen. A spirit of improvement appears to be abroad: experiments in cultivation, investigations into the modes of culture in other countries, and an examination of the principles of agriculture are now heard of among us. These are auspicious signs.

But there is wanting some bond of union among farmers—something which may connect them in one body, dignify the profession as a separate interest, and give it power and consequence. Agricultural societies are what are now wanting. In some places where such institutions have first been proposed and formed, prejudices have arisen against them. It is possible that some of the same feeling may exist here. They have been pronounced of no practical utility. It is a general truth so clear that no one has ever had the folly to deny it, that individuals associated for a common purpose, whose feelings and energies are enlisted in the attainment of one object, may enlighten, aid, and benefit each other. This being obvious, what constitutes agriculture an exception? What is there in the nature of the case to prevent the usual effects of union and concert? It is an axiom that union is strength: why may not this force be as effectually applied to the improvement of the cultivation of the soil as to the colonization of Africa, or any other object which societies have accomplished. Men coming together from different parts of a district, of unequal capacities and experience, brought up under different circumstances, and having had different opportunities of observation, would be able to communicate much that was new and valuable, one to another. What one may never have tried, another may have submitted to the test of experiment. What one may never have thought of, another may have examined. What may have been invented by one, another may have improved. What is unintelligible to one, another may explain. Thus would there be mutual improvement, each contributing his store of observation and information, and receiving in return that of all the rest. What was private property, would become a common possession. The collected wisdom of the body would be attainable by each member of it. There is no art that can be so perfected by individual skill, as by mutual communication. The sublimest geniuses that have made discoveries and inventions both in science and art, could have received assistance and benefit from the co-operation of others. In the works of Newton, errors have been detected by far inferior men, and corrections made. Upon the inventions of Arkwright and Fulton, improvements have been made. Thus it is useful both to the skilful and the ignorant, to avail themselves of the experience and information of others. Agricultural societies furnish one of the best means of diffusing useful information. At their meetings, the results of experiments are detailed, the best

modes of management canvassed, and the experience of members elicited on the various points of husbandry. They promote experiments. There is nothing more wanting in our section of country than a series of accurate experiments on the various modes of culture and improvement here, and elsewhere, with a view to ascertain which are best adapted to our soil and circumstances. This is a new field for investigation—for such has heretofore been the extraordinary apathy of our citizens, that notwithstanding the reports that have reached them of the wonderful products of farms in New York and elsewhere, they have, for the most part, walked in the *good old way*, that has come down to them sanctioned by ancestral usage. The information which we have derived from books, and periodicals, has been, until recently, obtained exclusively from experiments made in other sections of country. These should be made on our own soil and among our own citizens, and I doubt not, that many facts would be ascertained of great practical utility. Another advantage of these societies is, in the manifestation of the value of varied knowledge and science to the agriculturist. The subject is susceptible of a division into two parts—theory and practice. There is much importance to be attached to each, and unless both be correct, there is danger of fatal errors.

One would scarcely expect to find an able surveyor, or a skilful statuary who had not studied the theory of his art. Much less need we expect to see an able and successful farmer who manages his estate to the best advantage, who has not learned the principles on which his art is based. There are good theorists whose practice is bad, because they do not carry their principles into execution; but, there can scarcely be good practitioners of any art, whose theories are incorrect. As well might we expect figs from thistles, as good husbandry from erroneous principles. When agriculture is more studied, perhaps it will be found that there is as much necessity for the establishment of schools for its promotion, as for the endowment of military academies and other institutions—such as are the usual objects of the support of governments. If the patronage of the state should be regulated by the importance of the object, there is certainly none more worthy of its support. It is as much within the province of our legislature to establish a professorship of agriculture in our University, as that of Moral Philosophy, or any other. There are many examples of this kind in other countries.

Again, the farming interest, by uniting in associations of this kind, will increase its strength, enhance the respect due to the profession, and be able to act with more efficiency when its rights are in danger. It cannot be doubted, that the cultivators of the soil constitute more than nine-tenths of the population of the United States. Here is much the greater portion of the wealth, and physical, and moral strength of the country. Let this power be brought into harmonious action, and it is perfectly irresistible. The manufacturing interest is indebted for the power it has wielded, principally, to its acting in masses. Being collected for the most part, in establishments of from 100 to 1,000 persons, they have produced an impression by no means commensurate with their numbers. Ten disciplined soldiers will keep in subjection a hundred citizens not united. Upon a similar princi-

ple have the manufactories exerted a power out of all proportion to their intrinsic strength. Thus, if agriculturists will unite in societies, and cherish their own interests, it is beyond the power of all other trades and professions together, to secure legislation that is obnoxious and oppressive to this department of industry. The natural tendency of societies of this kind is, to promote a spirit of competition and improvement. When the members are collected at their annual meetings, and statements are given of the modes of culture, the products and results, the advantages of judicious management will be so obvious and attractive, as to excite emulation. The habit of exhausting and destroying the soil will give way to the calls of interest. When it is made so manifest that none can doubt, that it is more profitable to improve, than to destroy, the system of destruction will cease. At present, it is quite common to hear individuals calculating how long a piece of land will last. When accounts reach us of great crops that are made at a distance, many are incredulous, others doubt if the expense of cultivation is not too large, and few are willing to attribute them to a good system of culture. But when some one among us produces one hundred and thirty, or one hundred and seventy bushels of corn to the acre, (which have been made to the North, and which our lands with equal improvements are more competent to produce, for our climate is more favorable,) then, perhaps, the faculty of sight will produce conviction. The honor attached to premiums is also very efficient, in rousing and exciting to extraordinary exertion. A feeling of salutary rivalry is induced which is well calculated to have happy effects. Again, the example of other countries forms a powerful argument in favor of the establishment of societies for the promotion of agriculture. The great improvement and immense increase of the produce of England, have been generally attributed, principally, to her societies, and her National Board of Agriculture. An English writer, speaking of this latter institution, says, "it made farmers residing in different parts of the kingdom acquainted with one another, and caused a rapid dissemination of knowledge through the whole profession. The art of agriculture was brought into fashion—old practices were amended—new ones introduced—a degree of exertion called forth, heretofore unexampled in this island." We have no reason to believe, but that similar effects would be produced here by the use of the same means. Bonaparte looking to the sources of national wealth, and the means of augmenting the resources of France, with his wonted sagacity, established many agricultural societies and Professorships, Botanical and Economical Gardens for the exhibition of the different modes of culture, and the dissemination of plants. But we need not travel abroad to see the salutary influence exerted by such institutions. The states of Massachusetts and New York, have both taken these societies into their patronage, and the former has contributed largely to their funds. The appearance of these states, (and the Northern states generally) where these associations exist, fully attests their happy effects. With climate and soil by nature inferior to our own, they have surpassed us in their products and improvements. I might, were it necessary, quote the authority of the most illustrious politicians and patriots of our state in

favor of the means suggested for the resuscitation of the worn and exhausted energies of our soil. Washington, Madison, and many others, have borne testimony to the good consequences which would be the natural result of societies properly constituted and maintained. Let us avail ourselves of the sources of fertility which abound among us; let us enter with spirit, activity and perseverance, into improvements of our land and our system of cultivation, and we shall no longer suffer reproach on account of the poverty of our soil, or its irrational and wretched management.

For the Farmers' Register.

PERFORMANCE OF A THRASHING MACHINE, AND WHEAT FAN.

We were present, by invitation of Jeremiah Nicols, Esq. of Kent County, Eastern Shore of Maryland, on the 10th of September inst., to witness the operation of his thrashing machine, and wheat fan.

The thrashing machine was put in motion, and was run without cessation, for one hour and forty-nine minutes, when the stack of wheat was exhausted. The straw was cleared away, and the machine again started, and worked without cessation for one hour and thirty minutes, when the second stack was finished. The sheet was then spread, and the fan was put in motion, and worked until the sheet on which the fanned wheat was received, was filled; the time employed was twelve minutes, and the product measured fifty-three bushels. The fan was again started, and continued to run fifteen minutes, when the sheet was again cleaned, and forty-nine and a half bushels measured up. The fan was again run for nine minutes, when the wheat in bulk was exhausted—and, upon being measured, there proved to be twenty-six bushels. The wheat scattered about the machine, and at the tail of the fan, and about the floor, was estimated by us at from eight to ten bushels—and Mr. Nicols has since reported, that after we left him, it was chaffed, and measured ten and a half bushels. The statement, therefore, stands thus:—

Whole time of running the thrashing machine, - - -	3 hours 19 min.
Whole product, - - -	139 bushels.
Average per hour, - - -	41 $\frac{1}{3}$
Or near 42 bushels per hour.	
Whole time of fanning, - - -	36 minutes.
Quantity chaffed, - - -	128 $\frac{1}{2}$ bushels.
Average per hour - - -	214 $\frac{1}{2}$ do.

The occasion of the difference at the different experiments with the fan was, that the richer parts of the bulk, with less straw, and nearer to the fan, were first taken: there was afterwards more straw, and the wheat was taken somewhat farther from the fan; and the three hands with their baskets, did not always keep the fan supplied. We think, that a full supply of wheat would have produced throughout, as large a yield as the first twelve minutes—which was at the rate of 265 bushels to the hour.

The thrashing machine is one made by Arthur Kitchen, which has been running seven or eight years—was worked by four horses, and with a light draught. The fan was manufactured by Sinclair and Moore, of Baltimore, with a slight alteration made by Mr. Nicols, who informs us, that

until altered by him, it was with great difficulty, he could get 60 bushels chaffed in an hour with her.*

In giving the number of bushels, we are to be understood, as intending *clean* wheat—an allowance having been made in measuring, more than sufficient, in our judgments, to meet any diminution in a subsequent fanning.

The number of hands employed while thrashing the first stack was—one man hand who drove all the time; one man hand who fed all the time; two who handed wheat to the feeder; one man chiefly engaged in oiling the machine; one man and a boy to load the cart at the stack and drive to the machine; one boy cutting the bands of the sheaves, assisted by the man who oiled, and two men attending to clearing the separator and removing the straw—in all eight men, and two boys: afterwards, in thrashing the second stack, and while fanning, one of the men who had been employed in handing wheat to the feeder, was absent.

E. F. CHAMBERS,
THOMAS WILKINS,
HIRAM BROWNE,
BARTUS TREW.

15th Sept., 1834.

[The necessary exclusion of this communication from No. 6, (for want of space) has given us time to write to Baltimore to inquire about the improvement of the fan abovementioned. It is described as very simple—and perhaps our description may enable others to use it. The improvement by Mr. Nicols consists in two boards being placed one above the other, and across the fan, and between the vanes which force the wind, and the riddles. The parallel edges of the boards next the vanes are about nine inches apart, and six or seven towards the riddles. They form a kind of long funnel through which all the wind is directed to the riddles and its force concentrated precisely where it is required.]

ON THE LOSS CAUSED BY THE USUAL MODE OF GETTING FODDER FROM CORN.

Brookfield, (Henrico,) 9th Nov. 1834.

To the Editor of the Farmers' Register.

In some of the foregoing Nos. of your Register, several articles have appeared, deprecating the system generally adopted, of pulling fodder from, and cutting tops off corn stalks, before the corn itself is sufficiently matured. That this system is highly injurious to the corn, and an injudicious mode of management, cannot be doubted. Some writers on this subject, have estimated the loss of corn, sustained by the stalks being thus prematurely mutilated, at from eight to twelve bushels per acre; how near either of these estimates may approximate to the real general loss, I cannot from experience or observation, determine. Notwithstanding the many articles which have been written on the subject, it does not yet appear that any of them have obtained that attention amongst farmers to which they were justly entitled; and it is with a conviction of the importance of this matter to agriculturists, and with a view of inviting

their attention to an affair where their interests are so deeply concerned, that I presume to offer a few cursory remarks. As this is the season when the hopes which the husbandman had founded on the success of his corn crop will either be realized or disappointed, they may perhaps, in addition to the more practical remarks of other writers, be the means of eliciting a greater degree of attention to a matter of no trifling importance to the interests of every farmer.

The observations which I have been enabled to make on the corn crop under my care, and on that of several surrounding farms, where the practice of pulling fodder and cutting tops is pursued, has been sufficient to convince me that the system is a bad one; I and have no hesitation in saying, that the farmer who adopts this system, loses one-fifth of what his corn crop would produce him were the blades and tops allowed to remain on the stalks until the corn became perfectly matured.

To a person even slightly acquainted with vegetable organology, it must be self-evident, that the leaves and tops of a corn stalk form one of its principal conservative parts, and as such, have important functions to perform in the vegetable economy of that plant: and that these functions are indispensably necessary to the growth and perfection of its reproductive organs cannot be doubted. Admit this, and it naturally follows, that to deprive the plant of these organs before they have fully completed the functions which nature allotted them to perform, or before the whole vegetable economy of that plant is completed, and you inflict on it a positive and irreparable injury. If corn, or any other grain, be prematurely deprived of parts performing functions so indispensably necessary to its propagation, as are its tops and leaves, whether such deprivation be inflicted systematically or by accident, shall so far tend to diminish the quantity of its produce, and it follows as a necessary consequence, that the quality even of that diminished quantity suffers in the same ratio—thereby diminishing its nutritive qualities and weakening its reproductive powers, and by this means perpetuating the evil on every succeeding crop: a good crop cannot be expected from bad, or imperfectly matured seed.

Corn may justly be considered an indispensable article of food in this section of country, and one of the principal sources of profit to the farmer. Why then, should it alone, of all cultivated grains and grasses, be subjected to this unnatural mode of treatment?—for, that its tops and leaves are less essential to the properly maturing of its seed than that of any other plant, cannot be admitted. The farmer therefore, who adopts this system, is not only guilty of a direct infringement on the established laws of nature, but also of inflicting a positive injury on himself, inasmuch as he is the active agent in so far destroying the remunerating part of his corn crop, without receiving any adequate compensation; for, under no circumstances will the fodder compensate him for the loss sustained in the quantity of his corn. Let him calculate his loss of corn at one-fifth, (which I think, rather under than above the real loss) add to this, the expense of pulling and curing his fodder, even under the most favorable circumstances, and he will find the balance heavily against him. I am aware, that on many farms fodder is considered an indispensable

* The improved fans will be manufactured and for sale by Sinclair and Moore next spring.

article of food for cattle in winter. Cases of this nature, may at first sight, exhibit some seemingly plausible reasons for pursuing this system, on the law of necessity; but a little reflection will easily adduce proofs that the general necessities of these cases do not require any such heavy sacrifice. Any farm generally, capable of producing a tolerable crop of corn, will also, in most cases, produce an ample supply of corn, and other grasses for the support of a stock of cattle on the farm throughout the season, and at the same time be the means of improving and ameliorating the condition of the soil.

As a means of coming to an exact knowledge of the extent of the injury which the farmer inflicts on himself, and the community at large, by adopting so ruinous a system, it would be necessary to make various experiments in different sections of the country. Experiments of this nature, I am aware, have been repeatedly made; but it is in the power of every farmer to try the experiment for himself—it can put him to very little inconvenience, and no extra expense. Suppose a portion of the corn field of any convenient or wished for extent, be selected for the experiment, on which, the corn is all equally good; divide this into five equal divisions, containing each the same number of hills and stalks on a hill: from the first division of this selected piece of corn let the fodder be pulled and the tops cut, as generally done; from the second, pull the fodder from the whole of the stalk, but do not cut off the tops; from the third, pull the fodder from the stalk only so far up as the ear, leaving the tops as in the preceding division; from the fourth, at the time when it is usual to cut off the tops, cut the stalk even by the ground with all its leaves, and top on, and set it up in small quantities together;—(this part of the experiment would, I think, clearly prove that at this stage of the growth of the corn, that the leaves and tops are a much more important conservative part of the plant than even the roots;) and in the fifth division leave the whole entire on the ground until the corn is perfectly matured—and when such is the case, pull the corn from all the divisions on the same day, and carefully weigh the product of each separately. Probably some more eligible method might suggest itself to some of your readers—however, I think some general experiment such as the above, would at once show the imperfection, and consequent loss to the farmer of the present system of pulling fodder and cutting tops. The sooner it is exploded the better for every farmer.

A. N.

From the Farmer and Gardener.
New Lebanon, Camden County, N. C. }
September 26th, 1834. }

I cut the tops of a piece of corn above the first joint in the following manner. I began with the first row, left the next, cut the third, and so on, cutting every other row through the piece. This was done when the corn was soft—say when it would answer to roast. In about two weeks I cut another piece in the same manner, and watched the result. At the time of the first piece was cut, we term it here, I found it was as and there was no where the

tops were cut, and those that were left uncut; but not exactly so with the second piece. In this, the blades on the cut rows were somewhat drier than those on the uncut. At gathering time, we could not perceive any difference in the corn; but I was not as particular as Mr. Clark. If I had been, perhaps I might have found much more difference than I observed. (I very much admire his mode of managing the experiment.) I continued the above experiments for three years, and found the result the same—since that time, I have only cut the tops to feed my horses with, in a green state, finding it so difficult to save the tops in our wet section of country.

Most respectfully yours,

PHINEAS SANBORN.

[We present above, opinions both for and against the common practice of stripping the leaves and cutting off the tops of corn, while the plant is still green and full of sap. The experiments of Mr. Sanborn were made with so little care and attention to accuracy, (as he seems fully sensible of,) that they are but little to be relied on—or rather, are entirely inconclusive. This we regret, although his opinion is opposed to that which we have several times expressed. The communication of our correspondent A. N. would have been far more valuable, if he had made and reported the results of some of the experiments which he proposes—and we request of him, and of others, to make careful and varied experiments the next season. He was probably prevented, as we were, from doing this the last season, because it could not have been done so as to present correct results, and such as may be expected in general. The long and severe drought of August had more or less burnt the leaves of the plants generally when the grain was not more mature than is usual when fodder is gathered—and therefore, drought served to cut short the growth and filling of the grain, just as gathering fodder might have done—and leaving plants untouched, would have been attended with much less benefit than under different circumstances. The greatest injury must occur when the season is favorable to the most perfect maturity of the whole plant.]

Preceding the extract which we have taken from Mr. Sanborn's letter, he had stated that when "stalks of corn are broken off at the first joint above the shoot, before the corn, or even the cob is half made," instead of being barren, or nearly so, "that these stalks generally have the best ears on them. I have sometimes pulled out the tassel when I could but just see it, but never knew a stalk to be barren in consequence of it." Of the first of these facts, our observations do not furnish either confirmation or denial—though our impressions were that the stalks broken off early by violent winds, were not so productive. The latter fact we fully admit—but draw from it quite a different conclusion. The tassel is provided by nature (not as the leaves are, to elaborate and prepare the sap for feeding the plant, and to gather other aliment by absorbing carbonic acid gas and water from the atmosphere, but) merely to produce the fecundating *farina*, which is afterwards scattered by the winds, and falls upon and impregnates the "silk," or female blossoms of the plants. This fa-

rina is furnished in such abundance, that if the tassels of every second row of corn (or perhaps of every third or many) were taken off before the grain was gathered, the remainder would be sufficient to furnish the plants in the field. But for the purpose of the process, there is little doubt but that it would be profitable, and certainly, not hurtful to the crop. To form the tuiua, the plant must make some effort, and thereby its powers be somewhat exhausted—and if that is prevented (by removing the male blossoms) that effort would be directed to increase its grain, which would be as well impregnated from other plants. The benefit (under this supposition) would be similar to that found in the increased tendency to fatten caused by the castration of male animals. Soon after this function is performed by the tassels, they wither and become dry, and are evidently worthless as a part of the still green plant—which is another reason for believing that their being removed earlier could have done no harm. But whether the drawing out the tassel early would do good, or merely be not hurtful, it is altogether different from removing the top with all the leaves above the ear—and still more different from that process when preceded (as usual in the South) by stripping all the blades below the ear—leaving none to protect the speedy death of the before green plant.

Neither could it much affect the question if the very early cutting of the tops in Mr. Sanborn's experiment did no more harm than he believed. When mutilated so early, the plant has time to recover by means of the leaves left, and it lives long enough still to provide enough aliment to the grain. But when this is done near the close of the plant's life, and when all the leaves are taken at once, or within a few days' time, no other effort can be made by nature, and the plant dies from the mutilation. A healthy child, or robust youth, may have both legs amputated, and not only recover, but appear as well, and live as long, as if no such loss had been suffered. Indeed, if only a single case of this kind had been noticed, it would not be very strange that such a loss of limbs might be supposed, (however unreasonably,) rather to increase the developement of the other limbs, and perhaps of the man, in his general health and bodily powers. But certainly it would be a most strange conclusion, that because the man could bear this early loss, the like might be inflicted as safely, when his life was nearly ended, and all his remaining energies were wanting for some last effort.

In addition to the loss in the growth of the grain supposed to be caused by the usual mode of gathering fodder, there are other important considerations to which we wish to direct the attention of those who will make experiments next year, for the purpose of testing the truth of either opinion. The loss of corn in ears broken off in gathering fodder, is very great, but cannot well be estimated by itself. There is another expense, however, which may well be estimated—the actual cost of gathering and securing a crop of blade and top fodder—and if properly estimated, we suspect it would (in the average of seasons) be found to amount so nearly to the value of the crop secured,

as to have the diminution of the grain (whatever that may be) almost a *clear* loss. We have never heard of such an experiment but once. This was made in 1833 by a very attentive and industrious farmer, whose work is generally executed well and economically, and who may be relied on for the accuracy of his observations and statements. He had no labor to furnish for securing his fodder (from a field of very good corn,) except that of some able young fellows then cutting wood for sale, and who were hired at the high rate of \$9 the month. They gathered and secured the fodder—and from an accurate account of the time and expense, the labor alone made the fodder cost its owner sixty-six cents the one hundred pounds, which is nearly its usual price at the stacks, after good seasons. The blades were stripped to the tassel, and of course, no tops were cut. In addition to the crop being very good, and of course being the more profitable to gather, the season was good, and nothing lost by bad weather. A different report would have to be made of such a season as the last, when the fodder was half burnt before being pulled, and a spell of ten days rainy weather occurred before the whole crop could be secured.

As yet, there has been nothing known on this important subject in the Southern States, from actual experiments. Nothing is better worth the attention and investigations of our new agricultural societies—and if a series of experiments were instituted, which would clearly settle all doubts on the subject, the reports thereof might prevent the loss of millions of dollars to the farmers of this region. One such series of experiments, carefully observed, and satisfactorily reported, would do more for the welfare of agriculture, than all the labors of all the agricultural societies that have yet existed in Virginia. And yet this would be but one of a thousand such benefits which their *properly directed* labors and investigations might produce.]

For the Farmers' Register.

PROCEEDINGS OF THE NEW LONDON AGRICULTURAL SOCIETY.

The first Show and Fair, (fully attended,) of the New London Agricultural Society, was held at New London, on the first Tuesday and Wednesday of November, 1834.

FIRST DAY.

Hector Harris, chairman of the committee on Original Essays on Rural Economy, made a report, recommending the Essay, by Achilles D. Johnson, of Campbell, as entitled to the society's premium; which was adopted, and the premium awarded.

William L. Bell, chairman of the committee on grain crops, made a report, recommending that the society's premium for the highest product of maize, on any two contiguous acres, be given to Charles Anthony, of Campbell, for 190 bushels of good merchantable corn, made on two acres of alluvial land, (rich river bottom;) and stating that Benjamin A. Doreld, of Bedford, and Alexander Austin, of Campbell, were also competitors for the same premium; the former of whom had produced from two acres of alluvial land (a rich old mill

pond) 152 bushels of the like corn and five hundred loads of pumpkins; and the latter 100 bushels of the like corn, from two acres of poor ridge land, with a single manuring; also recommending that the society's premium for the highest product of wheat on any two contiguous acres, be given to William Radford of Bedford, for 161½ bushels of good merchantable wheat, made on 4½ acres of land, being about 36½ bushels per acre; which was adopted, and the premiums awarded.*

Odin G. Clay, chairman of the committee on stallions, brood mares, colts, fillies, jacks and mules, made a report, recommending that the society's premium for the best stallion be given to J. Wright, of Bedford, for his stallion, Faultless, by Shakspeare; that the premium for the best brood mare, be given to William W. Austin of Campbell, for his brood mare, Florizella; that the premium for the best colt, be given to Robert Campbell, of Bedford, for his colt, Go-ahead by Shakspeare, three years old; and that the premium for the best jack, be given to Francis Adams, of Campbell, for his jack, Sancho; which was adopted, and the premiums awarded.†

Robert Campbell, chairman of the committee on bulls, cows, calves, rams, boars and sows, made a report, recommending that the society's premium for the best Durham bull, be given to John Smith, of Bedford, for his full blooded bull, Bolivar; that the premium for the best bull, of common stock, be given to John T. W. Read, of Bedford, for his bull, Clear-the-cow-pen; that the premium for the best cow, be given to William Radford, of Bedford, for his three-quarter Durham cow; that the premium for the best calf, be given to William Owens, of Campbell, for his half-blooded Devon calf, Tecumseh, 10 months old, weighing 600 lbs; and that the premium for the best boar, be given to John Callaway, of Bedford. The committee also reported, that there were several other very good bulls, calves, and a cow, exhibited, to wit: the bull Bishop, by Ralph Smith of Campbell, and the bull of William C. Leftwich, of Bedford, both part Durham, and another by John Callaway, of Bedford; a black calf, Prince, by William Davis, of Campbell, 5 months old, weighing 500 lbs, and another calf of William Owens, of Campbell, a half Devon, 10 months old, weighing 550 lbs. Also a cow of the Jefferson breed, by Samuel Smithson, of Campbell. The committee further reported, that there were several other subjects exhibited, which, in their opinion, were excluded from premiums by the 11th article of the constitution; which was adopted, and the premiums awarded.

SECOND DAY.

Exhibition of Domestic Manufactures.

Odin G. Clay, chairman of the committee of domestic manufactures, reported, that they had performed that very pleasing duty, and that, from the many beautiful and excellent articles exhibited to

them, they have selected the following, as deserving the respective premiums offered by the Society:

1. A piece of carpeting, manufactured by Mrs. Dabney, of Campbell county.
2. A piece of fine woven cloth, manufactured by Mrs. Alexander, of Campbell county.
3. A yarn counterpane, manufactured by Mrs. James Leftwich, of Bedford.
4. A specimen of sewing silk, manufactured by Mrs. Robert Mills, of Bedford.

The committee further reported, that there were sundry other excellent articles exhibited to the inspection, for which the society have offered no premiums: and should there be funds in the treasury, they would earnestly recommend that some suitable premiums be awarded for the following articles, which they have selected with great care, from a variety of others: which was adopted, and the regular premiums awarded, together with the following:

To Mrs. William Radford, of Bedford, for a cotton counterpane, a silver cup.

To Mrs. Claiborne Creasey, of Bedford, for a yarn counterpane, a silver cup.

To Miss Elizabeth Robinson, of Bedford, for a hearth rug,

To Mrs. John Tyree, of Bedford, for a piece of fancy work,

To Mrs. Charles Maernum, of Bedford, for a piece of carpeting,

To Mrs. Rowland Ward, of Campbell, for a papaw carpet,

To Mrs. William Adams, of Bedford, for a piece of yarn cloth,

To Mrs. William L. Bell, of Bedford for a piece of counterpane,

To Mrs. William Steptoe, of Bedford, for do,

To Mrs. Francis Adams, of Campbell, for do

The president, according to the constitution, delivered his address, which was concise and pertinent, and for which he received the unanimous thanks of the society.

It was resolved that the Editors of the Lynchburg Virginian and of the Farmers' Register be respectfully requested to give the proceedings an insertion in their respective papers, together with a copy of the constitution and the president's address. Also that the secretary subscribe for the Farmers' Register, and procure, if practicable, all its numbers, and have the same well bound, for the use of the society.

The election of officers, for the ensuing year, resulted as follows: Wm. Radford, president; Gerard Alexander, 1st vice president; Benjamin A. Donald, 2d vice president; Alexander Austin, secretary; Henry Brown, sen. treasurer; William W. Austin, Thomas Steptoe and James S. Dillard, executive committee, all re-elected.

The meeting then adjourned until the first Tuesday in May next.

ALEX. AUSTIN, Sec'y.

*Gerard Alexander, of Campbell, made 62½ bushels of wheat, weighing 65 lbs. per bushel, on two acres of land, part of a larger field. The constitution, relative to grain crops, was unanimously amended; for which, see the constitution.

†The pedigrees of stallions, &c. &c. having been withdrawn by their owners, nothing more than is stated, is remembered by the secretary.

No decision having been made by the committee on stallions, &c. &c. relative to fillies, that subject was referred to the executive committee.

CONSTITUTION—Adopted 31st August, 1833.

Article 1. The society shall be styled, *The New London Agricultural Society*, and shall hold its meetings in the town of New London, and county of Campbell.

2. The objects of the society shall be to improve the state of agriculture, to encourage domestic household manufactures and implements of husbandry, and to improve the breed of domestic animals.

3. The officers of the society shall consist of a president, two vice presidents, a secretary, a treasurer, and executive committee of three members; all of whom shall be elected by ballot, and shall serve until the end of the annual meeting, which shall take place in the month of November, in each year, or until their successors be appointed.

4. The president shall preside at all meetings of the society and of the board: all motions shall be addressed to him; he is to decide all points of order and by him shall all decisions and votes of the society or board be declared; and in the event of an equal division, he shall have the casting vote. He shall deliver an address to the society at the annual meeting in November, or appoint some member to perform that office. In the absence, death or resignation of the president, his duties shall be performed by the 1st vice president, and in his absence by the 2d vice president. When neither of these officers is present, the society may appoint a president, pro tempore.

5. The secretary shall record the transactions of the society in a book to be provided for that purpose; he shall receive in charge all the papers of the society, carefully filing away all letters and communications thereto; and shall cause such communications to be published as the president may direct.

6. The treasurer shall keep a correct account of all receipts and expenditures of the society in a book to be provided for that purpose, and shall pay no money out of the funds of the society, but by order of the board, in writing, signed by the secretary; except for books, postage and other small incidental expenses, of which an account shall be kept by him. It shall be his duty also to keep a correct list of the members of the society, and exhibit annually a statement of the funds.

7. Any respectable citizen may become a member of the society, who will subscribe his name to this constitution, and pay to the treasurer the sum of two dollars, on or before the 1st Tuesday in May, 1834, and the like sum annually thereafter.

8. Each member shall be at liberty to withdraw from the society whenever he may think proper on giving notice to the treasurer in writing, first paying up all arrearages, if any be due.

9. Distinguished citizens of this state and of other states may be elected as honorary members, and it shall be the duty of the secretary to notify them of the election.

10. A quorum to transact business must consist of nine members at least, including such of the officers of the society as may be present. Upon the adoption of this constitution the society shall proceed forthwith to an election of all the officers and of the executive committee, to serve until the annual meeting in November, 1834, when a new election shall take place for the ensuing year.

11. There shall be two regular meetings of the society in each year; one on the first Tuesday in May, at which time the society shall determine the amount and character of the premiums to be offered; the other on the first Tuesday in November, which shall be called the annual meeting; at which time the *Agricultural Exhibition and Cattle Show* shall take place; and on the following day an exhibition of such domestic manufactures, as may be brought forward, on which day the premiums shall be awarded. At the annual meeting in November, in each year, premiums shall be awarded on the following subjects.

For the best original essay on rural economy, by a member.

For the best cultivated farm, by a member.

For the highest product in maize, wheat and oats, on any two contiguous acres, by a member.

For the best stallion, bull, ram and boar, respectively.

For the best piece of fine woollen cloth, of blanketing, of table cloth, of carpeting and of counterpane, each not less than five yards, and to be manufactured in some family in the county of Bedford or Campbell, or in the family of some member.

It shall be the duty of the meeting in May, annually, to specify such other articles, on which premiums may be awarded, as they may deem expedient. No premium shall be awarded, unless the subject exhibited shall be of such a character of excellence, as, in the opinion of a majority of the persons appointed to decide, shall be entitled to a prize.

12. The president, or in his absence one of the vice presidents, and the executive committee, shall compose a board, a majority of whom shall make all necessary arrangements for the exhibitions, and appoint committees to examine the articles that may be offered at the annual meeting, to judge between competitors, and award prizes. It shall be the duty also of the executive committee to appoint a skilful auctioneer, to dispose of such articles as may be exhibited for premiums, if desired thereto by the proprietor.

13. This constitution may be amended at any of the regular meetings, by the concurrence of two-thirds of the members present; but the society shall have power to pass such by-laws as they may judge necessary for promoting the objects of the society.

AMENDMENTS—First Tuesday in May, 1834.

The 7th article of the constitution was amended unanimously, by adding thereto, "whosoever shall become a member of this society, between the first Tuesday in May and the general meeting in November, in any year, shall pay two dollars to the treasurer, at the time of subscription."

General meeting in November, 1834.

The 11th article of the constitution was amended unanimously, as follows: "the premium for the highest product in maize and wheat shall hereafter be confined to not less than three contiguous acres of high land. No premium shall hereafter be given for * and all that part of the constitution, coming within the purview of this amendment, is repealed."

*The paper sent was illegible here.

ADDRESS OF WM. RADFORD, ESQ:

President of the New London Agricultural Society, at its late Anniversary.

Gentlemen of the Society.—Among the various and diversified occupations of man, there is no subject of more importance, or which is more necessary to his comfort and welfare, than a judicious system of agriculture. Land is the kind and prolific parent, which furnishes food in all its varieties for the sustenance of our bodies, and the clothing which is necessary to protect us from the inclemency of the weather. How important is it, then, that every means should be adopted to add to its fertility and to increase its product? Yet it is lamentable to say, that, in the extensive range of science embraced in our seminaries of learning, from the laws which govern the motions of the heavenly bodies to the minute study of insects, no place is found for acquiring the knowledge of that employment, which, of all others, most conduces to our comfort in this life, and which in fact is indispensable to our existence. Well has it been remarked, "that whoever could make two ears of corn or two blades of grass to grow upon a spot of ground, where only one grew before, would deserve better of mankind, and do more essential service to his country, than the whole race of politicians put together." Yet while each branch of science has its appropriate professor, agriculture has been left to flounder along, unaided and unassisted. Each cultivator of the soil follows the murdering process of his ancestor, until the fields become unable to support the beasts that work them, and the hapless proprietor abandons his home, to seek, in the recesses of the western forests, other lands, which will furnish him a more abundant harvest. We are ignorant of the nature of the soils we cultivate; and consequently we cannot know what substances are proper to restore their lost fertility. How melancholy is it to see the fine rich vein of red land, running through the counties of Nelson, Amherst and Bedford, reduced by an unskilful system of cultivation, to a point bordering on sterility? Yet amidst the general gloom which pervades our agricultural prospects, it is pleasant to see a gleam of light breaking in upon us. May I not congratulate the members present, upon the formation of this society, and upon a spirit manifested by all in relation to it? It is proof, strong as we can desire, that we are becoming aware of our defective system, and are determined to amend it. It will be the means of interchanging our ideas upon the various branches connected with agriculture, and of introducing a spirit of rivalry, which will be attended with the most beneficial results. Good ploughing, the first step in the improvement of land, is becoming general. The attention of farmers is now directed to the production and application of manures, without which, all other labors are almost vain. The great success of the farmers in the county of Albemarle, in improving and fertilizing their lands, so similar in quality to much of the land in this part of the country, is calculated to make the most favorable impression; and we may with confidence indulge ourselves in the pleasing anticipation, that by a similar system of improvement, our fields may, in like manner, teem with exuberant crops, affording abundance to man and beast. The great leader of agricultural improvement in Albemarle, the late Col. Thomas Mann

Randolph, although he did not live to enjoy the benefit of it, has proved himself to be one of the greatest benefactors of his native state, and is entitled to the highest gratitude. The system of horizontal ploughing alone, is of incalculable advantage in hilly lands, and owes its introduction to him. Let us then, fellow-citizens, availing ourselves of the lights which have been held out to us, advance to the good work, with the pleasing assurance, that, while we are adding to the value of our lands, and to the comforts accruing from their improvement, we are increasing the resources of the beloved state of which we are members.

In the general address which the president of this society is called upon to deliver, it is not expected that he should go into any detail of the various subjects connected with agricultural improvements. It will not, however, be amiss to mention some of the impediments which have retarded their success in this part of the country.

The cultivation of tobacco, by withdrawing nearly the whole labor of the farm and all the available means of improvement to one subject, has, more than any other cause, diminished the fertility of our soil.

A second obstacle to improvement, and nearly connected with the former, is the habit of giving a share of the crop, instead of a fixed salary, to the overseer or manager. When a part of the crop is given, it is the interest of the overseer (and we are all guided by our interest,) to make the highest product on the farm for one year. The improvement of the farm, the care of stock, and attention to the comforts of the slaves, form no part of his wages. He does not know that he will be employed longer than one year; and the largeness of his crop for that year, not only advances his present interest, but is his best recommendation for employment elsewhere. On the other hand, where the habit of giving standing wages is general, it introduces a salutary emulation among managers; it is not the heavy crop of one year that establishes his reputation, but it is the progressive improvement of land and stock, and of the comforts connected with them. The situation of the manager becomes more permanent, and he becomes better informed and more respectable. When fixed salaries shall become general, that class of persons will not be, at the end of every year, moving about, like figures on a chess board. In fact, the owners of moderate sized farms should be their own managers: it would make them more careful of improving their estates, would greatly diminish the expenses of agriculture, and, by furnishing constant employment to the mind and body, would tend, more than any thing else, to give them health and contentment, the two great sources of happiness in this life.

An injudicious rotation of crops, and the close pasturing of the fields, are heavy drawbacks upon the profits of farming and the improvement of land. To remove these obstacles, and to adopt a more judicious system of cultivation, constitutes the principal object of the formation of this society, for the success of which we must unite our best exertions.

The cheapest and most convenient medium for the improvement of the soil, in the district of country running parallel with the Blue Ridge, and for thirty or forty miles below it, is unquestionably gypsum or plaster of Paris; the free use of this up-

on clover (protected from the hoof) aided by a judicious rotation of crops, will restore to our lands their long lost fertility.

In conclusion, I must congratulate you, gentlemen, upon the interesting show of stock, and upon the handsome products of the soil, the salutary effects of organization of this society, and particularly upon the beautiful specimens of domestic fabrics exhibited by the ladies at this our first meeting. It only requires perseverance to accomplish the great objects for which this society has been formed.

ADDRESS TO THE AGRICULTURAL SOCIETY OF FREDERICKSBURG, AT THE ANNUAL MEETING, ON THE 13TH AND 14TH OF NOVEMBER, 1834.

By JAMES M. GARNETT, President.

Published in the Farmers' Register by request of the Society.

Permit me, gentlemen, once more to welcome you to another anniversary of our society. It has been held every year, I believe, without a single interruption, since our first establishment in 1818; which fact may therefore be considered, I trust, a sure indication of a still longer continuance. To commemorate it thus has always afforded an opportunity, highly gratifying, to renew our friendly intercourse; and, at the same time, beneficially to interchange such knowledge as each of us may have annually gained in regard to any, or to all of the various branches of husbandry. This knowledge, after all, is, in one sense at least, of more importance, than any other. It is the basis of national wealth; for, without it, none of the various professions, trades, and callings essential to national prosperity—so far as this depends upon wealth—can obtain even the means of subsistence. Well, therefore, has it been said, that "pasturage and tillage" (upon which husbandry itself, in all its branches, is dependent,) "are the two breasts of the state." But an eulogium on our profession is, I trust, entirely unnecessary before my present audience. Let me, proceed therefore, to state the few agricultural facts which have fallen under my own observation, since our last November meeting, that appear to deserve your attention.

The first relates to a variety of Indian corn, which seems to me—as far as I can judge from one imperfect trial—far more productive than any other I have ever noticed. Its history, or rather the circumstances which induced me to try it, are as follow: last winter, in Washington, two or three Maryland farmers of my acquaintance, gave me a very high character of it, and strongly recommended, from their own experience, that I should make an experiment with it. They stated that it was cultivated chiefly on the Eastern Shore of Maryland, where it was called "the twin corn;" (I should rather call it the extra prolific,) and that it produced, in every variety of land, considerably more than any other corn they had ever tried. I procured a barrel in the ears from my friend Col. Lloyd, (since dead,) who was an experienced farmer and a gentleman of unquestionable veracity. His present was accompanied by a letter, in which he assured me, that, after a fair trial, he thought the difference in favor of this variety was equal to at least fifteen per cent., and that many of his

neighbors estimated it still higher. I distributed ears among several gentlemen of my acquaintance, all of whom—at least all that I have seen—speak very highly of it. My own experiment was rendered nearly abortive by a drought which commenced on the 5th day of July, and never ceased until the last day of August. Still I have seen enough to produce a determination that I will plant my whole crop of this variety next year. Before the drought began to act, I counted from five to eight good shoots and silks upon many stalks, all of which promised to make ears of corn; but the intense, parching heat of the sun, without rain for 55 days and nights, blasted my prospects, and left only the proof that more ears on a stalk came to perfection, than of either of the other two varieties which I cultivated, and had long considered of superior value to any that I had previously subjected to trial. The grain of this new kind is very white, but not so flinty as the homany or Madaira corn, and makes beautiful meal: the cob is also white, and uncommonly small; the ears, of course, are not large. It ripens somewhat earlier than the gourd-seed varieties, and the stalks throw out an unusual quantity of suckers, upon several of which, that I suffered to remain, small ears of corn were found. Enemy as I am to all kinds of exaggeration, and especially to the practice, so prevalent among our agricultural brethren, of "making all their geese swans," I will venture, notwithstanding, strongly to recommend extensive trials of this extra prolific corn, as I beg leave to call it. If it will add only three or four per cent., instead of fifteen, to a farmer's crop of this most valuable grain, it should be preferred to all other kinds.

While my hand is in, I will take the liberty to make another recommendation. This is—of the guinea-grass as a green food for horses, mules and other stock, to be cut from the 10th or 15th of June, until the last of October. It will be recollected, perhaps, that much was said and written about it several years ago, in some of our southern papers; and that after a while, both the voice, and the pens which had been so busy in its praise, entirely ceased their eulogiums. Why this should have happened I cannot imagine, unless the friends to its culture got wearied out by the little success of their recommendations; although it assuredly deserves a place on every farm in our tide-water country, where natural grasses are scarce.

Bryan Edwards, in his history of the West Indies, gives the following interesting account of its great value and its introduction into the island of Jamaica.

"The guinea-grass may be considered as next to the sugar-cane, in point of importance; as most of the grazing and breeding farms, or pens, throughout the island, were originally created, and are still supported, chiefly by means of this invaluable herbage. Hence the plenty of horned cattle, both for the butcher and planter, is such, that few markets in Europe furnish beef at a cheaper rate, or of better quality, than those of Jamaica. Perhaps the settlement of most of the north-side parishes is wholly owing to the introduction of this excellent grass, which happened by accident about 50 years ago; the seeds having been

* As the 1st edition of Edwards' history of the West Indies, printed in London, appeared in 1796, the intro-

brought from the coast of Guinea, as food for some birds which were presented to Mr. Ellis, Chief Justice of the island. Fortunately the birds did not live to consume the whole stock, and the remainder being carelessly thrown into a fence, grew and flourished. It was not long before the eagerness displayed by the cattle to reach the grass, attracted Mr. Ellis' notice, and induced him to collect and propagate the seeds; which now thrive in some of the most rocky parts of the island, bestowing verdure and fertility on lands which otherwise would not be worth cultivation."

Now—although I cannot say so much for it, in our climate, as the frosts kill the blades and stems in the winter, my short experience, together with the certain information which I have carefully obtained from others, fully warrant me in detailing both to you, as an inducement to make full trials for yourselves. If made as they ought to be, with the impartiality of men whose only object should be, to ascertain the exact truth, I have no doubt, that this exotic will soon hold the first rank among our cultivated grasses. Its right to do so rests upon the following indisputable facts: that it is a highland grass—that it will bear cutting much oftener than clover, timothy, orchard grass, red-top, or even lucerne—that it will annually yield a far greater quantity of green food, of which stock are very fond, than either of the before mentioned grasses—and that drought effects it much less. But let me proceed to the promised details.

Having understood, last winter, from sources on which I could entirely rely, that two gentlemen of King William had been cultivating this grass for some time, under a full conviction of its superior value to any other of our cultivated grasses, I wrote to one of them and procured roots enough to plant in March, two rows, 51 feet long. He directed these roots to be cut into pieces from two to two and a half inches long, and planted in shallow furrows about two inches deep, eighteen inches or two feet one way, and four feet the other; but by a mistake of my gardener the latter distance was made six feet. These roots came up in two or three weeks, and were suffered to grow until the seed appeared—the height of the plants being then fully seven feet by actual measurement, in land that might be called, only tolerably good garden ground, of a soil rather sandy, than stiff. This suspension of cutting was merely to ascertain the average height in such land, before the seed stems were fully displayed; and not to save the seed for sowing, as the gentleman from whom I procured the roots informed me that they were preferable to the seed, which vegetated badly. On the 19th of July, I cut the two rows, then more than seven feet high, and although the stems had become somewhat coarse and hard, every horse in my stable, to which the grass was given, eat it most greedily. It was again cut on the 4th of August, at the full average height of three and a half feet, a second time ascertained by actual measurement. My intention then was to cut it every fifteen days, until the frost affected it; but the drought which commenced with us on the 5th of July, was intensely felt by the end of the fortnight after the second cutting, on which account I left the grass

duction of the guinea-grass into Jamaica, must have taken place about 84 years ago.

untouched until the middle of October; when it was again cut, at the average height of more than four feet, and the two rows, only 51 feet long, filled a large tumbril body entirely full. During the whole of the most severe part of the drought this grass was the only plant on the whole farm, that preserved its verdure unimpaired; and although the growth was evidently checked, no dead or dying leaves appeared next the ground, unless it was upon one bunch that had not been cut at all; and this valuable emigrant, from the parching climate of Africa, seemed to bid defiance to a combination of heat and drought, which I, although now an old man, have never seen surpassed. At present the roots appear to have spread entirely across the six feet interval, although the sprouts from them are not as thick as those in the two rows. By next spring, however, I have no doubt that the whole space will be so covered as to supersede the necessity of any working between the rows, such as lucerne requires at least twice or thrice every year. Only two slight hoeings were given to this guinea-grass during the summer. That it will require the annual application of some manure, I think, is certain; for what plant is there which does not, if the whole growth above ground be taken from the soil? I neither know, nor have ever heard of any; it being a well established fact, that every plant, cultivated by the farmer or the planter, if removed entirely from the land, abstracts from it a certain portion of its fertility, which manure alone, of some kind or other, can restore. Guinea-grass is one of these plants; and from its yielding much more in bulk and weight than either of our other cultivated grasses—all of which require the regular application of manure to render their product equal in quantity each time of ingathering, it cannot be expected to reward the husbandman equally well, without similar nurture. Whether it will bear grazing, or will require more manure than other grasses, I have not yet been able to learn, but judging from the little manure, I bestowed on the two rows with which I made my experiment, guinea-grass does not need more than other grasses which are frequently cut and carried off the land.

I obtained last spring several parcels of the seed of another grass in regard to which many accounts have been published, that—to say the least of them—appeared very extraordinary. This is the gama grass; but not one of the seed sown by myself came up; nor any that I distributed among several of my acquaintances. I therefore give no testimony, but hearsay, respecting this recent agricultural marvel. All accounts that I have heard, without a solitary exception—save one from a traveller through Alabama—are in direct contradiction to all which I have read; for my verbal information from Georgia, South Carolina, and North Carolina planters and farmers, represent it as a very coarse grass, or, as some of them call it a kind of flag—so coarse that nothing will eat it, until nearly starving; while our written intelligence imposes a tax upon my credulity somewhat heavier than it well can bear. Thus situated, I know not which to believe to the full extent that it goes; nor how far to qualify these very opposite accounts, so as to come at the real character of the grass. If it be really a native grass of the southern states, which seems now to be agreed upon all hands, and deserves fully the praises bestowed upon it, the

most wonderful thing about it is, that it should never, until very lately, have attracted sufficient notice to be cultivated by any one; especially when good grass for horses and cattle is so great a desideratum throughout our whole southern country. Still the written accounts in its favor are too flattering, and derived from sources too respectable to be disregarded. Let us all, therefore, (as I certainly will myself) give this agricultural stranger a fair and full trial;—keeping all the while a good look out in the hope of a favorable result, for that favorite proverb of the worthy Sancho Panza which admonishes us that, "where we are least aware, there often starts the hare," is as useful in husbandry as it is in hunting. There is indeed no branch of our profession in regard to which we have been so negligent as in the culture of the various grasses adapted to our soil and climate: nor any to which the necessity for increased attention is daily becoming more and more urgent. Many of our farmers are incurring considerable expense in purchasing cattle of the improved English breeds, without any previous preparation of good pasturage for them; although all know perfectly well, that this is indispensable to their well-doing. The general dependence is upon the buds of the bushes in spring; and, during summer and fall, on such weeds as our fields produce, with peradventure, a little crab-grass, if hard cropping has not too far exhausted the soil to permit it to grow. Their winter food, in a vast majority of cases, consists solely of the offal from the wheat and corn crops; although the testimony in favor of using also the pumpkin, the cabbage, the potato, the mangel wurtzel, and ruta baga, especially for making good pork, beef and mutton, is as full and satisfactory as testimony can possibly be on any subject whatever. All the last named productions are well adapted to our soil and climate; all may be cultivated at an expense compensated far more than an hundred fold by the profits derived from them; and yet, I believe, it may be truly asserted, that not one farmer in 500 cultivates either of them for stock.

As for our sheep and hogs, poor devils, although some few attempts have been made to improve their breeds also, they are left, in almost all instances, to become their own forage masters:—the first to struggle against famine and death, through winter and a part of spring, by browsing upon cedar, pine, holly-bushes, and broom-straw; and the latter to fight the same hard battle, for the same vital purpose too, by seeking with their snouts, below the surface of the earth, that scanty subsistence which they can no where find above it. Now I think, that most of us might safely venture to turn reformers in all the foregoing particulars; provided only, we would avoid the mischievous precipitancy of that sad radical Jack in Swift's "Tale of the Tub," who tore his coat to tatters, in his haste to strip it of all its gold and silver lace. Might we not, for instance, have a few small lots of clover, orchard grass, and lucerne for spring feeding; guinea-grass, (if it turns out as I am confident it will,) for summer and two months of the fall; and then orchard grass again, or Peruvian grass, sometimes called the tall meadow-oat, for grazing, until hard frosts, which rarely come in the tide-water part of our state, before Christmas. I can see nothing to hinder it, but the want of fixed determination. Again, might we not have

pumpkins, cabbages, and root-crops cultivated on a scale sufficiently large, at least to help out with other food, in fattening our pork, mutton and beef; in feeding our milch-cows; and in keeping our work oxen through the winter? I cannot believe there is a single agriculturist in our whole state who would not answer these questions in the affirmative; but alas! our practice in this, as in far more important matters, is at war with our belief; and we still continue conscious victims of our own pernicious habitual indolence. To correct it, to shake it off entirely, requires that each man should become his own physician. All therefore that I can do, is, most heartily to wish success to every one of our agricultural brethren who will, in downright earnest, undertake his own cure.

Another fact which I deem worth your notice, is one obtained since we last met, of the capacity of the common black oat to stand even so hard a winter as our last, and make a good crop. An old clover lot had been sown with oats last spring twelve months. They were cut at the usual time, and the ground ploughed up early in August, to try wheat after oats, which I had some where seen highly recommended. The grain however, left on the land, came up so thickly, although in bunches with large naked spaces between them, that I changed my mind, and determined to cultivate the ground in corn during the present year. In the mean time, the oats were closely grazed, until hard frosts, as I had no doubt they would be entirely killed by the winter's cold. To my surprise, however, they put up in the spring, apparently as thick as ever, and I resolved to leave a part of them to ascertain how much they would produce. Had the ground been harrowed immediately after fallowing, so as to secure an equal distribution of the seed, I believe the product would have been doubled, for the naked spaces between the bunches appeared to amount to nearly or quite half the ground. These spaces, in some spots, were at least a yard square. The quantity actually measured was one hundred and fifteen bushels, being at the rate of nearly twenty-two bushels per acre. The product of the previous crop had been within a fraction of forty-one bushels per acre; but about three-fourths of an acre of the best part of the lot on which the volunteer oats grew, was taken off for corn. What effect the fall grazing of those volunteer oats might have had, I am at a loss to determine, although the probability, I think, is that the product must have been materially lessened by it. There are, however, ascertained facts enough in the case to render it of sufficient interest to justify my making it known to you. One word more, as to the oat crop. Several very good farmers have told me, that the fall ploughing of land designed for oats in the spring, will increase the product, as they themselves have proved, much more than will pay for the additional labor. Quere, is not this experiment worth making; especially since the wheat crop in our tide-water country, seems every year to become more and more precarious?

Before I conclude, permit me to invite your attention to another topic of considerable interest—at least to all cultivators of small grain. We have now a great variety of machines for separating it from the straw, and their number is annually increasing. The inventor of each publicly claims for his own, a great superiority over all

others: and has never failed, so far as I recollect, to obtain from reputable farmers, some certificates to sustain his claim. Now this cannot possibly be true, for there can be only *one best* among implements of similar kinds. But notwithstanding this fact, the claim of superiority—sustained as each one generally has been—is a source of such great perplexity to every farmer who has never had an opportunity of seeing all those conflicting claims fairly tested, that many—like the ass between two bundles of hay—are prevented from making any choice at all. Such I acknowledge, was my case for several years previous to the last. It is highly desirable to prevent this uncertainty, if possible; and I would respectfully suggest the following expedient—provided the heretofore merely nominal committee of agriculture appointed by the legislature—will do nothing towards attaining the object. Let two or three members of our society, in each of their respective counties, or one in each county, where one only can be found, endeavor to procure and to attend accurate trials, during the next summer, of all the different kinds of wheat machines used within the said counties, and report fully and minutely, at our next fall meeting, the result of such trials; and if none can be found willing to perform this important service without pay, let their expenses, where any may be incurred, be defrayed out of the funds of our society. To render such reports effectual in communicating the requisite information, let it be required, that they should contain as particular a description of the structure and performance of each machine, as the examiners are capable of making. For example, let them report the cost—the number of horses or mules used in working them—the number of revolutions performed in a minute, by the cylinder or drum—the number of teeth or beaters on each, the number of bushels got out per hour, as well as the kind of wheat with which the trial was made—the number of grains left in a certain number of heads taken promiscuously from the straw, after it has passed through the machine, as well as the number of grains in the same number of heads taken in the same promiscuous manner, out of the wheat which has not passed through. Let it also be stated whether the straw was dry or damp when the trial was made; whether the machine be stationary or portable; and whether it effects its work by combing or hackling the wheat—as some call it; or by beating or rubbing it out of the straw. A knowledge of all these particulars appears to me absolutely necessary to enable any one to form a correct opinion as to the comparative merits of the multitude of machines for getting out small grain, that are continually soliciting our patronage; and therefore I hope to be excused for the foregoing very minute enumeration of all the facts that seem to me essential to a just decision, in regard to the numerous conflicting claims upon which all purchasers of wheat machines must decide, before they can properly determine which to buy. I myself have carefully examined some six or eight different kinds; but although I think several of them are very valuable, yet none fully justify the puffs that I have read of them in our public journals. Thus far, however, I believe, may be truly asserted in regard to their comparative merits, that all which are constructed on the combing or hackling principle, are superior to any which were made on the principle of beating or rubbing, pro-

vided the cylinders of the first and the drums or beating frames of the latter kind, make the same number of revolutions in the same time. This, I am confident, will be perfectly obvious to any person of the smallest mechanical knowledge, who will take the trouble accurately to examine and compare any two machines made on these two different principles. It is hardly possible for tangled wheat, of which there is always a great deal in every crop, to pass through a combing or hackling machine, without each head receiving several severe strokes; whereas, it may easily pass entirely unstruck through a beating or rubbing machine, if presented sideways—as it often will be. This is frequently the case where the wheat passes through rollers before it comes into contact with those parts of the machine which separate the grain from the straw. I have examined four kinds of such machines, and consider the best of them inferior to the worst combing or hackling kind, where the velocity of the cylinders and drums was the same. In the latter kinds, of which I have seen three, the wheat is not passed through rollers, but placed in immediate contact with their cylinders. The teeth of all these act edgewise, and are all square at the end, having nearly the same length from the surface of their cylinders to the end of the teeth, and each kind about three-eighths of an inch thick. But in Douglass's cylinder they are flat, being wider than they are thick; in Capron's nearly square, and in Fox and Bolland's they are staples made of square iron, and wider between the points where they enter the cylinder, than at the outer end with which they strike the wheat.

It should be remarked of the three machines just mentioned, that they beat, as well as comb the wheat, for the edges of all their teeth are flat—are nearly of the same thickness, and strike with such force as to make a loud noise like a humming top, whenever they are working at their right speed.

It is proper here to notice what I said last year, in regard to Bayliss' machine, as it has been incorrectly stated, if I have not been misinformed, that I preferred it to all others. No person who read my last address could well have misunderstood me; for I had not then, nor have I yet seen it tried; and of course, could not have ventured to pronounce any positive opinion about it. All I then said, or can now say, amounts to no more than that it promises well to the eye, and will certainly prove a valuable machine, if its performance equals the seller's assertions of what it can do. That he believes what he says I have no right to doubt; but if his faith in the excellence of his machine does not exceed its real merits, it will be the first instance that I have ever met with, wherein an inventor or vender of an invention, had not proved over sanguine in his calculations. This recurrence to what I have formerly said of Bayliss' machine, in regard to which I cannot pronounce any conclusive opinion, would not have been made, but for my great solicitude never to be, even the innocent cause of deceiving my agricultural brethren, in regard either to wheat machines, or any thing else. Nothing, in fact, is more important towards the introduction of any new implement, or practice in husbandry, than unexaggerated accounts on the part of those who recommend them; since representations of a contrary character tend invari-

bly to produce so general a disbelief in all such accounts, as greatly to retard the introduction of numerous highly useful inventions. Even where a few may be prevailed upon to try them, the least short-coming of the recommendation itself is apt to check farther experiments, and to cause the immediate disuse of the thing recommended, although it may really be very valuable. Such misrepresentations too, help much to sustain the silly prejudice against what has been called, by way of derision "*Book Farming*," which ought to be, and, in fact, generally is, nothing more than the printed records of the experience of practical agriculturists and husbandmen. The speculations, with which these records are often blended, may always be separated from the facts upon which they are founded; and, therefore, ought never to invalidate the facts themselves, in any case where the latter are sustained by creditable testimony—however visionary the former may sometimes appear.

We have now an agricultural paper peculiarly adapted to our whole southern country—I mean the *Farmers' Register*, wherein a greater mass of such useful facts will always be found embodied, than can elsewhere be found together; and I avail myself of this occasion to recommend it most earnestly, to all who are not already subscribers. Even the remarks of the editor himself, who has long been a practical and highly successful farmer, are, in my opinion, fully worth the price of the work, to say nothing of the numerous valuable communications with which it is enriched by agriculturists, as practical as he is. If now and then, a few hobby-horses are permitted, (*speciali gratia*,) to prance through his columns, they always carry a brand upon them, by which they may easily be known, and rendered harmless. For my own part, however, they are heartily welcome to the small share of the field which they occupy, since they serve to diversify and enliven a scene which, otherwise, might appear to some too uniform in its character. Variety, both in bodily and mental food, seems, in the present times, to be almost a necessary of life; and hence the use of such fantastic cavalry, as these agricultural hobbies generally form, in a work devoted solely to the great interests of husbandry. To laugh occasionally, all doctors say, will aid the digestion of food for the body; who then will venture to assert that it does not produce an equally beneficial effect on the food of the mind, since the intimate connexion between the two is acknowledged by all. The editor of the *Farmers' Register*, like a good cook, sometimes seasons his viands with condiments not directly nutritious, but such as may act the part of stimulants to some appetites too fastidious for the plain, substantial, unseasoned aliment of which he furnishes in every paper as much as reasonable men ought to require, when they reflect for what a variety of tastes he has to provide.

I am the more earnest in pressing my recommendation of this agricultural journal,—(the only one now in Virginia,) from a thorough conviction of long standing, that the vast superiority of northern and eastern husbandry to ours, is attributable, in a great measure, to the number of agricultural papers and journals, which for many years past, they have constantly encouraged among them. These in co-operation with their numerous and flourishing agricultural societies have steadily main-

tained so vigorous a spirit of improvement in all the branches of husbandry, that they have far surpassed us in every one, although both their soil and climate are much less auspicious, than our own. I am well aware that it is the fashion with some, who have never taken the trouble to study the subject, or to think for themselves in regard to it, deeply interesting as it certainly is, to ascribe this superiority, solely to our slave population. But allowing every draw-back that can reasonably be attributed to this cause, still, the circumstances which I have stated will be found, upon a thorough examination of the whole ground, to contribute very largely towards that remarkable difference which has always existed between southern husbandry, and that in the northern and eastern states. It is so striking that "he who runs may read it;" and so beautiful as to excite our wonder at the snail-like tardiness with which we agriculturists of the south, creep on in our feeble efforts to follow such praise-worthy and profitable examples.

I cannot, I believe, close my remarks more usefully, than by repeating my most earnest recommendation of the *Farmers' Register*; for I am thoroughly satisfied, that very many of our agricultural brethren have not yet grown too wise in their own conceits to learn; and that they will gladly seek, as soon as they know where it may be found, the highly useful information relative to all the branches of their profession, which this paper is so well calculated to disseminate among us.

From the Philadelphia Friend.

THE HUMMING BIRD.

Some time in the seventh month of the present year, one of my family caught a small humming bird, which appeared quite debilitated for want of food. We presented it with some sugar and cream mixed together, which it sucked up with avidity, after which, it was restored to liberty. In the course of a short interval it again made its appearance, was taken in the hand, and a mixture of sugar and water made into the consistence of syrup, was poured into the *corolla* of the trumpet honey suckle, from which it eagerly extracted it. From this time forward it became quite familiar, and would come a dozen times a day or more to be fed. After fluttering a few seconds at the door or window to attract notice, it would alight on the limb of a neighboring tree, or rose bush, until its food was prepared for it, and then upon calling "Peet, Peet," it would dart in a straight line with the velocity of an arrow to receive it. We generally filled two or three of the tubes of the honey suckle with the syrup, which it extracted while on the wing, buzzing around the flower held in our hand, and inserting its bill, which was about three-fourths of an inch in length from which it protruded its tongue, at least half an inch longer, with which it sucked up the liquid.

This generally sufficed it; but sometimes it did not appear satisfied, but would repair to its resting place and wait until the flowers were again filled, when upon being called, it would return and finish its repast. But if, after flying to its perch, it wiped its bill on the limb, we were then assured that it wanted no more at that time, and all the solicitations we could make would have no other effect than to hasten its departure. In the course of half an hour it would be back again after more food, and

if the member of the family to whom he applied was engaged and not ready to attend him, he would try over and over again to excite attention, by flying into different apartments of the house, and buzzing within a few inches of our faces. "Peet's" solicitations generally succeeded, as the younger branches of the family were delighted in attending to him. He appeared to be more fond of syrup when made thick than any other food which was offered to him. If it was too much diluted, after sipping a little he would fly to his resting place and wait until it was altered. We also at times gave him sugar and cream, wine and water mixed with sugar, and once some honey obtained from an humblebee's nest, which it appeared to treat with great contempt.

Sometimes when he was fluttering around the flower held outside of the doorway, a stranger of the same species, having less confidence in human nature, would dart at the little fellow and drive him away, as if anxious for him to escape from so perilous a situation. But it only had a momentary effect on our little friend, as he would return with as confiding an assurance of safety as before. His little twittering noise and averted eye, as he momentarily withdrew his flower, appeared to say surely thou wilt not hurt me. After he had visited us every day so frequently for about three weeks, and had been admired by numerous persons, he disappeared on the 11th of last month, being fed about the middle of the day, which was the last time he was seen. As the wild humming birds which were quite numerous before, disappeared about the same time, it is probable he accompanied them to more southern regions. As we were on terms of the most friendly kind, it is hoped our little traveller will again revisit us after he has finished his perigrinations among the flowers of the south, as it is very doubtful whether he will find them as sweet as he did the honey suckles of Delaware county.

M. M.

Ninth mo. 4th, 1834.

[We have heard several unquestionable statements which concur with the foregoing in proving that the humming bird may be easily tamed. When taken full grown, they will soon begin to eat, and become familiar. A young lady of our acquaintance, has at different times reared two young humming birds which were brought to her in their nests. They fed on a mixture of honey and water, sucked from a vial. Both very soon became perfectly tame, and required no confinement, except to protect them from the cat, which killed one after it could fly. The other lived longer. It was fully grown before it disappeared, and had several times visited the adjacent woods, and was seen with companions of its kind, but would return when sought for, and suffer itself to be taken by the hand of its mistress. It was not confined, and the cause of its disappearance, during the same summer, was not known. Perhaps, the time had arrived for it to seek its winter home in a more southern region.

The flowers of the coral or native honey suckle of Virginia are, of all, the most attractive to humming birds, or furnish the liquid food on which they live, in most abundance. A large vine of this honey suckle when in bloom, will seldom (in fine weather) be with-

out one or more of these little visitors: and if the vine is trained near the windows, they will often enter the house—and might perhaps be induced to repeat their visits, and be easily rendered tame. We recommend to some of the young ladies who (we hope) are readers of the Register, to attempt the domestication of the humming bird. What other pets could compare in interest with this most beautiful of nature's works, which seems scarcely to belong to the earth? The delicacy of its form, the brilliancy and variety of its colors, and the singular beauty of its movements, are beyond what the most vivid imagination could have conceived, if the reality was unknown. If Marmontel's romantic Elise could have seen a humming bird enter her window, she would have readily believed it to be the form assumed by her sylph lover—and certainly no material form more appropriate could be imagined, in which to embody such an ethereal being.]

QUERIES ON STONE FENCES, GYPSUM AND LIME.

To the Editor of the Farmers' Register.

Campbell County, November 18th, 1834.

I am just commencing a system of improvement, and as I have no experience of my own to guide me, I am compelled to avail myself, so far as it is practicable, of the lights of others. In the country where I live, agriculture is, as yet, in a rude and primitive state. The great bulk of our cultivators have made no effort to reclaim their exhausted lands, and are still practising the same unskillful and destructive tillage, by which our state has been so completely impoverished. The few who, like myself, are attempting a better system, have made but little progress, and are, generally, regarded by their neighbors as idle visionaries; and we must be content to bear this character, until we give practical evidence to the incredulous, of the benefits of our new plan of cultivation. There is, however, a presage of better things. The land owners of this quarter are, I think, generally impressed with the necessity of doing something, and that speedily, to renovate the rapidly depreciating soil, and only require a successful example to encourage them to the effort. Having still some fresh land in cultivation, and some in forest which may be cleared, they will not labor under the same difficulties and discouragements in commencing a system of improvement, to which the older parts of the state have been subjected; unless they should imprudently defer the adoption of that system, until, like the sloth, they have devoured the last leaf, and have nothing left but a painful and tedious migration. I think there is a general disposition to reduce, and gradually to abandon the culture of tobacco, without which, I am sure, no great or successful effort can be made towards the renovation of our lands.

Our soil is a stiff and close loam unmixed with sand, and resting, for the most part, on a foundation of red clay. There is an occasional intermixture of what we call gray land, which generally inclines to be glady, and is, commonly, subject to become very wet during the winter and spring. The substratum of this gray land is, generally, a yellow, and sometimes a red clay.

The face of the country is broken and hilly, and covered, frequently, with a large quantity of round flint rock, and occasionally with a flat slate rock. I have commenced the use of plaster and clover, and next year, shall have clovered the entire farm. Lime is burnt at about fifteen miles of me, where it can be purchased at ten cents a bushel. I have not yet made any experiments with lime, but design to do so on a small scale in the spring. I have adopted the horizontal ploughing, and shall adopt Mr. Skipwith's hill-side drains, as soon as I can find time to do so. I shall, however, enter into that system gradually, being disposed to carry it no farther, than is absolutely necessary to prevent the land from washing. That I may proceed in the system I have begun with *understanding* and *knowledge*, I propose the following queries to yourself and your correspondents, to which I beg a prompt and explicit reply.

Query 1st. What is the best mode of fencing with round flint rock? What should be the width of such a fence at the base? What the slope of the sides? To what height may it be carried without impairing its strength? Is it necessary to dig out a foundation, and if it be, to what depth should the excavation be carried? I should be glad to have an answer on these points from some person of experience, accompanied with a diagram of the fence.

Query 2nd. In using plaster, is it of advantage to mix ashes with it? If so, in what proportion? Should the ashes be dry or moist?

Query 3rd. In using lime, what quantity per acre should be applied to a poor soil with a red clay foundation? Would not the effect of the lime be greater, if the surface was first covered with rough unrotted manure? Whether the lime should be slaked or unslaked? What effect it would have on creek bottoms, having a sandy surface resting on a clay foundation?

Can I get the favor of you to publish these queries in the successive numbers of your Register until they are answered. In doing so, you will aid many who are just entering on the career of agricultural improvement, and more especially,

A QUERIST.

[Referring these queries to the consideration of our readers in general, and hoping, as in every like case, that among them, some will deem it a duty to give information when it is thus asked for, and it is in their power to bestow, we shall confine our remarks to a single point.

Though the mixture of caustic lime with rough stable or farm-yard manure has been recommended as advantageous, we should pronounce it altogether wrong, judging from theoretical opinions of the action of these different kinds of manures. Quick-lime acts by breaking down the hard and insoluble parts of vegetable matter, and thus rendering it more speedily fit for the food of plants: but on vegetable and animal matter already fit, or rapidly becoming fit to sustain plants, quick-lime is always injurious, by *eating* or *destroying* those matters, or forming chemical compounds less valuable as food for plants, than the putrescent matters before they were so acted on. Stable and farm-yard manure, before being rotted, or when but slightly rotted, contain some rich matters ready for the immedi-

ate sustenance of plants, and a much larger proportion of insoluble matter, not yet fit for that purpose. The lime will hasten the action of the larger proportion of inert matter, but will destroy the portion already soluble. If then one-fourth (in value) of the manure was fit for the support of plants, and three-fourths still insoluble and inert, the mixture of enough caustic lime would serve to destroy the one-fourth; but by bringing into immediate use thrice as much, the lime would *appear* to increase the value and profit of the manure, when it had merely squandered the present, and anticipated the use of the future active value. If all the vegetable matter was coarse and inert, the action of quick-lime thereon would be altogether beneficial; and altogether injurious, if the vegetable and animal matters were ready, or rapidly becoming ready, for the use of plants. These remarks apply only to lime in its caustic state, and not at all to it after it has become carbonated, or mild, by exposure to the air. For some additional information in this subject, "*Querist*" is referred to the *Memoranda* of the farming of the late Fielding Lewis of Weyanoke, in No. 1 of Vol. I. of the Farmers' Register.]

For the Farmers' Register.

DESULTORY REMARKS ON FERMENTING, PRESERVING, AND APPLYING OF PUTRESCENT MANURES.

The preservation and proper use of putrescent manures form the most important of all the operations of the farmer, and occupy a large portion of the mass of instructions contained in the numerous works on agriculture. Yet there is no important subject less understood than this, which forms a subject of investigation for every theorist, and of continued use for every practical farmer. The general (perhaps I may say universal) want of knowledge on this subject will appear least strange to those who have given it most consideration; and young and inexperienced agriculturists are apt to think more highly of their opinions in this respect, than they will after having increased their value by twenty more years of investigation and practice. Every one knows, that putrescent vegetable and animal matters collected from any sources—accumulated in any manner—and applied to land at any time—will generally serve to increase the amount of vegetable products. But the best and most economical mode for these operations, under various circumstances, is what no one knows—and even to approach that end, will require qualifications which very few (if any) individuals possess. For a full and satisfactory investigation, there would be needed the well weighed and compared opinions of the chemist, and the physician, as well as of the judicious practical farmer. We should know what are the spontaneous changes and the various products of every stage of the fermentation and putrefaction of vegetable and animal matter—and whether these products of fermentation vitiate the atmosphere and are injurious to health, and how such effects are to be restrained or remedied—and the rules thence derived, to be confirmed by results obtained, and observations made, by practical cultivators. But though no one person may be able to do justice to the whole subject, very many of the rea-

ders of the Farmers' Register can furnish information on some branch of it. I invite all such, to a free conference in the columns of this journal; and will commence offering my mite of contribution forthwith, in the hope that others better qualified will engage in the discussion. However loose, or imperfect, the views of each of us may be, a free and unreserved expression of them will scarcely fail to add to the correct information of all. If a scrutiny of my opinions should prove them to be erroneous and worthless, still their expression will not be useless, if they should serve to elicit instruction and truth from other sources.

Facts learned from practice, and correctly understood, certainly are of far more value than any mere theoretical opinions. But in processes so varied as the management of manures, in which so many unseen and unsuspected agents may operate, and so many chemical changes take place—in which each difference of soil, temperature or season, serves to affect and carry the result, so that no two operations can possibly be made throughout precisely alike—practice alone will prove a blind guide, unless directed by rules drawn from sound theory. Farmers of good judgement, and long practice, are found to advocate every different mode of preserving and applying manures, and each refer, to experience and to facts, to prove his mode the best. *Facts, the causes of which are misunderstood, are not truths, and serve only to mislead us:* and the only means of understanding the results that practice furnishes, will be to investigate their causes, which is to learn the true theory of their operation. This course I will attempt with respect to manures—and for this purpose, it is necessary first to state the established laws and known phenomena of those spontaneous changes of animal and vegetable substances, which are comprehended under the name of

Fermentation.

Chemists have bestowed much care in the investigation of the whole process of fermentation as it is exhibited in the formation of spirituous liquors, and of which the knowledge is necessary to the brewer and distiller. If equally careful researches had been extended to the fermentation of manures, the benefit conferred on agriculture, and on mankind, would be of incalculable value. Unfortunately, chemists have not yet thought the latter subject worth more than slight and general notice—and have only made loose and random applications of the fermentative processes of liquors, to the very different and ever varying changes in the substances that form manures. We must be content to use these imperfect lights, in making our investigations—and even by their aid, we may yet be able to arrive at truths of great importance to agricultural improvement.

Almost every kind of dead vegetable or animal substance is *putrescent*, or under certain circumstances will ferment and rot. Such substances vary greatly (according to their texture and component parts) in their tendency to pass through fermentation: and none can ferment without the presence of three agents, viz. *air, water, and a certain degree of temperature*, which must be above the freezing point, 32° , and becomes more favorable to the progress of fermentation, as it approaches to summer heat. If either of these three agents is totally excluded, no fermentation can begin, no matter how favorable may be both the others: and

if all are present, fermentation will certainly take place, and proceed with more or less rapidity according to the more or less favorable circumstances existing. These well established chemical truths, are of universal application, and should never be lost sight of in considering the spontaneous changes of putrescent manures.

It will be useful first to trace the effects of fermentation in the formation of spirituous fluids, as the most correctly understood, and the most familiar to observation. These fluids pass through three successive kinds of fermentation, which are called the *vinous*, the *acetous*, and the *putrefactive*. Some consider a still earlier change as properly termed the *saccharine fermentation*.

If apples of harsh and acid flavor are bruised, or beaten for cider, the mass very soon acquires an increase of saccharine matter, and the juice when expressed, is a sweet cider. This is the result of the *saccharine fermentation*. Another form is presented in the sugar formed by the soaking of grain in water, preparatory to distilling—and another, in the natural change of acid to sweet juices, in the ripening of fruit.

The *vinous fermentation* next takes place. If new cider, or any other fluid containing saccharine matter is exposed undisturbed to a temperature between 60° and 80° , it first becomes turbid and viscid; an intestine motion and increase of bulk gradually take place; air bubbles are discharged from every part of the mass, forming a froth on the surface. The sweetness of the fluid is lost, and a different and strong taste is acquired. Afterwards, the fluid deposits a copious sediment, and becomes transparent. It has then acquired a vinous odor and an intoxicating power.

If this or any other vinous fluid be exposed to a heat between 75° and 80° , and air be admitted, other changes take place. It loses its peculiar taste and qualities, and becoming acid, is converted to vinegar. During the change, the liquor is again turbid, its surface is covered with a mouldy pellicle, a quantity of fibrous matter separates, and forms a kind of skin, which sinks to the bottom, and is vulgarly called the *mother* of the vinegar. This is the *acetous fermentation*.

The *putrefactive fermentation* takes place when the decomposition of vegetable substances is suffered to proceed beyond the production of acetous acid. The vinegar gradually becomes thick and foul: air is emitted with a fetid odor: an earthy sediment is deposited. Finally, scarcely any thing remains but the salts, the alcohol, and the earths which formed the constituent parts of the vegetable: the fluid, if any is left, is water and acetous acid.*

Davy thus describes the changes which take place in other substances, and which in general are such as affect all collections of substances for manure. "If any fresh vegetable matter, which contains sugar, mucilage, starch, or other of the vegetable compounds soluble in water, be moistened, and exposed to air, at a temperature from 55° to 80° , oxygen will soon be absorbed, and carbonic acid formed; heat will be produced, and elastic fluids, principally carbonic acid, gaseous oxide of carbon, and hydro-carbonate will be

* Accum's Chemistry—from which the description of the three last kinds of fermentation is abridged.

"evolved: a dark colored liquid, of a slightly sour or bitter taste will likewise be formed; and if the process be suffered to continue for a time sufficiently long, nothing solid will remain, except earthy and saline matter, colored black by charcoal. The dark colored fluid formed in the fermentation always contains acetic acid: and when albumen or gluten exists in the vegetable substance, it likewise contains volatile alkali.

"In proportion as there is more of gluten, albumen, or matters soluble in water in the vegetable substances exposed to fermentation, so in proportion, all other circumstances being equal, will the process be more rapid. Pure woody fibre alone undergoes a change very slowly; but its texture is broken down, and it is easily resolved into new elements, when mixed with substances more liable to change, containing oxygene and hydrogen. Volatile and fixed oils, resins and wax, are more susceptible of change than woody fibre, when exposed to air and water; and even the most inflammable substances, by the absorption of oxygene, become gradually soluble in water.

"Animal matters in general are more liable to decompose than vegetable substances; oxygene is absorbed, and carbonic acid and ammonia formed in the process of their putrefaction. They produce fetid compound elastic fluids, and leave a residuum of salts and earth, mixed with carbonaceous matter.*

We are ignorant of the respective proportions and value of these different gaseous products of both vegetable and animal fermentation and decomposition, and which of them it is most important to arrest, and which we can best afford to lose. But this is certainly known—that the final result of all the successive changes caused by the fermentation of manures, is the conversion of all their soluble and nutritious parts into different gases, which, being aeriform and elastic fluids, immediately escape into the atmosphere, and are utterly lost. In the above passage, all the valuable parts of manures are distinctly traced to that end, except the dark colored liquor which is formed and flows from fermenting manure—and this is equally destined to the same final decomposition and loss, if not previously saved by being put to use. It might require the time and expense of years, to produce all the changes from fermentation in a large body of manure, and arrive at the final result, the destruction and loss of all its nutritious and valuable parts: but whether the process is rapid or slow, fermentation is always tending to that end. These changes, the farmer may hasten, or moderate and retard—but he cannot possibly prevent their taking place. His only choice is either to use the products of fermentation as fast as they become fit for the food of plants, or by permitting them to assume an airy form, to let them be lost entirely. To adopt and practice the former course would be the perfection of manuring—a state which we may aim to approach, but never can reach, until chemistry shall be properly applied to agricultural investigation and improvement. But though it may be impossible to use manures so as to secure from waste and destruction all the products of fermentation, still we may gain much in that respect by properly considering

and applying the instruction, limited and imperfect as it is, with which we have been furnished by chemistry. Before, however, we can pursue the investigation of what products of fermenting manures we should endeavor to save, it will be necessary to know what are serviceable as the food of plants, which will now be considered, before resuming the subject of the fermentation of manures.

The Food of Plants.

The absurd doctrines which have been taught as agricultural truths, are strongly exemplified in the several opinions that have formerly prevailed as to what constitutes the food of plants. By one class, it was supposed to be water—by another, air only—and by Tull and his disciples, pulverized earth was believed to be the food of plants, and that water, air, and manures only acted mechanically in presenting that food to the roots. Among scientific inquirers these opinions have long been exploded, and it is now the received opinion that the food of plants consists of all the vegetable and animal matters which are soluble in water, and may be drawn up by the roots—and such aeriform matters as are absorbed by the leaves of growing vegetables. "Plants, says Davy, are found by analysis to consist principally of charcoal and aeriform matter. They give out by distillation volatile compounds, the elements of which are pure air, inflammable air, coally matter, and azote, or that elastic substance which forms a great part of the atmosphere, and which is incapable of supporting combustion. These elements they give either by their leaves from the air, or by their roots from the soil. All manures from organized substances contain the principles of vegetable matter, and during putrefaction, are rendered either soluble in water, or aeriform—and in these states they are capable of being assimilated to the vegetable organs. No one principle affords the pabulum of vegetable life; it is neither charcoal, nor hydrogen, nor azote, nor oxygene alone; but all of them together in various states, and various combinations."* Carbonic acid gas, which is present in small proportion in all atmospheric air, and which is produced by every kind of fermenting matter, is supposed to be taken up largely by the roots of plants,† as it undoubtedly is by their leaves—and from this supply, is formed the carbon of plants, or that large proportion of their substance that may be converted into charcoal. Water is also absorbed from the atmosphere by the leaves of plants, and this power which the bounty of nature has provided, can be most exerted when the weather is dry and hot, as the air then holds the greatest quantity of water in solution.

All putrescent matters then being composed of the same few component parts that serve to constitute all growing plants, (carbon, oxygen, hydrogen, and sometimes nitrogen or azote,) it follows that every particle of the former, as manure, may serve as the food of plants. But the probability is, that the roots of plants cannot effectually take up these elementary bodies after they have assumed their gaseous form: and if no growing plants are

* Agricultural Chemistry—Lec. I.

† Library of Useful Knowledge—on the Food of Plants.

* Agricultural Chemistry.

present when this final change takes place within the soil, these substances, from their light and elastic nature, must quickly and entirely be lost to the earth, and to use, as to the food of plants. It must be then, principally or entirely, in some of the earlier previous forms, fluid or solid, during the various changes produced by fermentation, that these elements of manures act as the food of plants. Davy has proved that nothing solid, however finely divided, can be absorbed by roots, and that every thing soluble may be.*

From all these premises, the following deductions may be considered as established: 1st. That putrescent manures may be entirely converted into food for plants: 2nd. That no portion of them can serve for that purpose while in a solid form: 3rd. That every portion will be, when soluble in water: and 4th. That much or all may be lost, if manures reach their final decomposition, and assume a gaseous form.

Let us now apply these deductions to the practical management and application of manures.

The fermentation of manures—to what extent necessary.

It was formerly the prevailing opinion among the farmers of Britain, (from whom most of our practices have been borrowed,) that a long and thorough fermentation was absolutely necessary to make manure nutritious and productive in the highest degree: and for this purpose much time was used, and much labor spent, in heaping the litter and dung of the farm-yard, and in turning over the heap, to renew fermentation after its first heat had subsided. Thus it was kept a year before using, and sometimes longer, even by such as were esteemed good and enlightened farmers. The celebrated grazier Bakewell, was accustomed to keep his manure before using, until it was reduced to the texture and appearance of black snuff.† It seems not to have been suspected, until a comparatively recent period, that any valuable principles of the manure were lost, by this general practice of long continued fermentation.

Afterwards a practice entirely different was introduced, and had many warm advocates, both scientific and practical. This was to carry out all manure from the stables and farm-yard in its coarse unrotted state, or when fermentation had barely commenced. This practice gave a far greater bulk of manure to the fields, and was supposed by its advocates to cause greater increase of product.

The discussion of the comparative merits of these different practices has been kept up in England for half a century, and yet remains undecided. As usual, both practices have been copied in this country, without regard to the difference of climate and tillage, and the dispute between "short and long muck," or fermented and unfermented manure, has been carried on here with as much zeal, and to as little purpose, as in our mother country. Our distinguished agriculturist John Taylor, has been the most able and influential advocate for unrotted manure, in Virginia, as Arthur Young was in England on agricultural, and Professor Davy on chemical grounds: and Judge

Peters of Pennsylvania, on the other side, has strenuously opposed their arguments and opinions. The principal argument used by all who have supported either side of this question, is the great loss of manure sustained by the practice they oppose: and unfortunately the loss suffered in either practice is so great, as to make this argument on both sides, if considered alone, appear abundantly strong. The usual practical operations of the disciples of both schools are also so defective, that they are condemned by the doctrines of their own leaders, no less than by those on the other side. Thus, Arthur Young, who so strongly urges the superior benefit and profit of using unfermented manure at all times, considers it absolutely necessary that it should be buried deeply and covered in the most perfect manner by the plough. Judge Peters, while maintaining the advantages of well rotting manure, by keeping it long enough in bulk, and using every care to have the fermentation thorough and complete, still tells us that it is indispensable to conduct these operations in a paved and roofed stercorary, so as to guard against the great losses that would otherwise take place. Yet the followers of Young omit the effectual covering of the manure by the plough—and those of Peters, leave their manure to pass through a year's changes from fermentation, exposed to rain, sun and air. Both practices are attended with serious objections and losses: but either one carefully and correctly carried on, doubtless is better than the other under the common wasteful management. And, from the difference in climate, it seems most likely that either of these opposite modes of manuring in Britain, must be less wasteful than when imitated in Virginia.

The great loss of fertilizing principles from fermentation carried on in the dung heap is so evident, that it ought to convince every one of the propriety of carrying out fresh manure, who does not fear other and equal waste from that mode. But though in this case the fermentation is lost sight of, it does not the less take place, and in such manner, that equal, if not greater loss may be well suspected.

The objections of Davy to the use of fermented manure, are entitled to most attention and respect, because in the chemical facts on which his opinions are founded, he could not have been mistaken. I will quote his words at sufficient length to give them full force. In his sixth lecture, after treating of the more simple and highly putrescent manures, such as the pure dung of different animals, and showing the impropriety of fermenting them before applying them to the soil, he proceeds to consider their mixture with less putrescent substances. "The question of the proper mode of the application of the dung of horses and cattle, however, properly belongs to the subject of *composited manures*, for it is usually mixed in the farm-yard with straw, offal, chaff, and various kinds of litter; and itself contains a large portion of fibrous vegetable matter.

"A slight incipient fermentation is undoubtedly of use in the dunghill; for by the means of it, a disposition is brought on in the woody fibre to decay and dissolve, when it is carried to the land, or ploughed into the soil; and woody fibre is always in great excess in the refuse of the farm.

"Too great a degree of fermentation is, how-

*Agricultural Chemistry—Lecture VI.

†Brown's Husbandry: Art. *Manures*, Edinburgh Encyclopædia.

"ever, very prejudicial to the composite manure in the dunghill; it is better that there should be no fermentation at all, before the manure is used, than that it should be carried too far. The excess of fermentation tends to the destruction and dissipation of the most useful parts of the manure; and the ultimate results of this process are like those of combustion.

"It is a common practice amongst farmers to suffer their farm-yard dung to ferment till the fibrous texture of the vegetable matter is entirely broken down; and till the manure becomes perfectly cold, and so soft as to be easily cut by the spade.* Independent of the general theoretical views unfavorable to this practice, founded upon the nature and composition of vegetable substances, there are many arguments and facts which show that it is prejudicial to the interests of the farmer.

"During the violent fermentation which is necessary for reducing farm-yard manure to the state in which it is called *short muck*, not only a large quantity of fluid, but likewise of gaseous matter is lost; so much so, that the dung is reduced one-half, or two-thirds in weight; and the principal elastic matter disengaged, is carbonic acid with some ammonia; and both of these, if retained by the moisture of the soil, are capable of becoming a useful nourishment of plants." A chemical experiment is then detailed, which shows, satisfactorily, the amount and kind of the liquid and gaseous products of a certain small quantity of fermenting manure—and in another, the gaseous matter, as produced, being conveyed under the roots of growing plants, showed its value as manure, by increasing their luxuriance. The author then states, that decided advantage would be also gained in using unfermented manure, by the heat from their subsequent fermentation being disengaged, and the consequent new combinations made within the soil, and in contact with the roots of growing plants. In addition to the testimony of many scientific agriculturists, cited generally in favor of the use of unfermented manure, and a number of proofs within his own knowledge, Davy quotes particularly the opinion of one, whom he says (and all of us will admit) will be considered as the highest authority. "Mr. Coke [of Holkham] within the last seven years, has entirely given up the system, formerly adopted on his farm, of applying fermented dung; and he informs me, that his crops have since been as good as they ever were, and that his manure goes nearly twice as far."

Davy's argument against the fermentation of manure previous to its application, is founded on his having proved by analysis, that manures contain more enriching principles before than after fermentation—and, therefore, certainly lose more or less of them by going through that process. All this must be admitted, and yet the inference may be false, that fermentation, previous to applying manures, lessens their ultimate value. The unfermented matter contains most food, it is true—but, for much the greater part, in a state unfit

for the use and sustenance of the plant: and so must it continue unfit and useless, until rendered soluble by a sufficient degree of fermentation. Whether most waste will be incurred by that necessary fermentation taking place in the farm-yard, or the dunghill, or in the soil after being applied, is the question to be decided. Raw meat and vegetables contain more nutritive matter for the human stomach, than after the loss necessarily sustained by their being cooked: yet the remainder, after this process, is fitted for the sustenance of man, and therefore is more valuable than the whole was before the change, and the waste, caused by cooking. The food of plants requires more complete preparation than that for men, or even for infants: and in either case, the fitness of the food for use is even more important than its quantity of matter capable of being converted to food by future chemical changes, which may take place, but which we have not the ability to direct, or to govern. The chemist cannot pursue the investigation of the waste by fermentation, after the manure is buried in the soil—and (with our present imperfect sources of light) the experience of farmers must be the best guide as to the comparative value of this practice, and that of fermenting previously. Still, whichever course is adopted, the lights of chemistry will best serve to warn us of the risk, and teach us how to lessen, if we cannot avoid, the losses that attend on both modes. Unfortunately, however, the testimony of many of the most enlightened farmers, as well as of the most ignorant, is entirely contradictory, as to the comparative value of fermented and unfermented manures.

In addition to the opinion of Davy, I might add not only the arguments of Arthur Young, but a number of proofs drawn from the practical experience of many farmers of their increased profits from using manures unfermented, and which he has stated at length in his *Essay on Manures*, and other works. Our own distinguished agriculturist Taylor, is equally decided in favor of the same opinion and practice, though the contents of his farm-yard, being principally corn stalks, were necessarily more coarse, woody, and unmanageable, before fermenting. He thus condemns the opposite practice. "In obedience to the old English authorities, I have in various ways compounded dunghills, kept them through the summer, and covered with earth and with bushes the manure of the farm-pen; and the loss has been regularly graduated by the fermentation produced, from a moiety to three-fourths; being invariably greater, the better the litter was rotted, or the greater the degree of fermentation.

It will not be necessary to quote so particularly the opposite opinions of Judge Peters, and other distinguished advocates for fermenting farm-yard manures before using them, because such continues to be the general course (though with every variety of practice) both in Britain and this country. Robert Brown, the very intelligent and practical farmer, who wrote the able article "Agriculture" in the *Edinburgh Encyclopedia*, has there described at length what he deemed the best practice of managing farm-yard manure, by heaping, &c., to ensure its fermentation before being used: yet throughout, he does not bestow a single opposing argument, nor does he even notice the existence

* The old practice of short dung farmers in Virginia, is to keep the dung in the heap, even six or nine months after this cessation of fermentation, waiting for the beginning of the next corn crop.

of the contrary practice, so much applauded by Young and his followers.

Those farmers in our country who have adopted the opinions and practice of either of the opposite parties in Britain, have not attended to the great differences of temperature in the climate, of the amount of moisture usual in summer, in the two countries, and the very important difference thence produced on the progress of the fermentation of manures, whether remaining in bulk, or buried in the soil. In England, and still more in Scotland, the climate is far more cool and moist than ours; and also far more uniform. They have neither our burning summer's sun, nor our long continued droughts. The compound contents of their farm-yards (from the nature of the litter and food of the cattle, and the greater richness of the dung of their fatter beasts,) are more putrescent than ours, which are principally corn stalks and straw, trampled by lean cattle, kept on dry and poor food. Yet the cool climate in Britain so retards fermentation, that it requires much care and labor on clay farms, to rot the winter's manure in heaps by August—and in dry seasons, the whole year is not sufficient for that purpose.* Here, our less putrescent manure, if heaped in March, (or even in mid-winter) soon ferments violently, and thoroughly, unless moisture is not generally diffused, or air is excluded from some parts by compression. It must thence be inferred, that if like modes of heaping, &c., are pursued in both countries, the violence of fermentation, and the consequent waste and destruction of fertilizing principles, must be much greater here, than in Britain. We labor under equal, though different, disadvantages in following the practice of the English "long muck" farmers. After their unrotted straw and other contents of the farm-yard are well buried by the plough, they remain undisturbed, and constantly moist. Fermentation may proceed very slowly—but at least it is not checked by drought, and exposure of the manure to the air. With us, the nature of our husbandry compels the application of manure that is fermented either very slightly, or not at all, to the corn crop, where it is necessarily often exposed by the plough, while its fermentation is in progress. If spread over much surface, the labor would be greatly increased, and the best effects of the manure scarcely perceptible. If the manure is laid thick, as is generally done from necessity (to save labor) no less than choice, a drought stops fermentation, and the mass of dry litter is for the time hurtful to the growing crop. That is not all the evil. The manure when spread in its coarse state, is no longer a mixture of various and different ingredients, as they become mostly separated by the spreading. Here, there is put on the soil a lump of pure dung, which remains a dry hard impenetrable body, if on the surface—or if beneath, it rots too fast for the roots to absorb its products. In another place is covered a mass of wet straw, which may ferment, or not, according to the season—and more often, hard and woody corn stalks, which, when alone, can scarcely be fermented without waste of principles, and injury to the crop. The coarse nature of our litter, makes it impossible to secure it by the plough. Supposing fermentation to go on, every corn stalk serves as a flue or chimney to carry off the gases which are evolved,

near to, or into, the air. The deepest ploughing, consistent with economy and good husbandry, could not prevent this loss. Unless growing plants by their roots should arrest them, gaseous products would rise and escape through every part of a sandy soil: and clay would be a still worse covering—as the plough in summer would leave it every where in clods with open intervals or vents between them.

If we continue the examination of all our usual modes of preparing and applying manures, and test them by the known effects of fermentation, and the received opinions as to the nature of the food of plants, we shall find that great loss is encountered by even the least wasteful. Yet though such loss can in no case be entirely avoided, attention to sound theoretical principles will enable us to save much that is now wasted, and to draw far greater profits from our manures of every kind. A brief description of the most usual modes of managing manure will be presented, none of which will need a very close trial by these tests to be proved extremely defective.

Our different practices of applying manure, though in each case directed by an opinion of the superior value of manure in some particular form, yet are not less governed by necessity, and the kind of husbandry in use. Thus, the farmer who is most anxious to have his farm-yard manure completely rotted, must be satisfied with its state (if heaped previously) as early as June: but we have no crop then to receive it—there is neither time nor labor on most farms, to spread it for wheat, after removing the corn preceding it (according to our usual rotation)—and consequently, the manure is not used before the next year, when it is given to the crop of corn. Considerations of convenience, such as these, perhaps prevent every farmer from adopting what he may consider the best application of his manure.

A practice very general formerly, and still not altogether abandoned, is to leave the farm-yard untouched from the spring, when the cattle are moved away, until summer, just before needing the yard to tread wheat on. By that time, and with the usual small proportion of vegetable matter, it was abundantly rotted for convenient use, if any crop required it. It was moved off on handbarrows, and heaped, to remain until the next spring: or during all winter, is carted out for the next year's crop of corn. Besides all the waste sustained by such long exposure of a wide surface to sun, air, and rain, the removal and heaping in summer must bring on a second fermentation, after the first (on the yard) had ceased—and the consequent waste of principles is compensated by no gain, as the fermentation was before enough advanced.

Others let the manure remain in the yard until it is taken into the carts to be carried to the field for use. Theory seems to pronounce this less wasteful than the plan of heaping and causing a second fermentation in summer: but the amount of waste in this case must depend very much on the thickness of the coat of manure on the yard. If two feet thick, it might be not much affected by the exposure, and its being close trodden would necessarily cause its fermentation to be slow and never violent. But if only six inches thick, the exposure to air and sun and water, and the consequent loss, would be greater, not only compara-

* See *Agriculture*, in Edinburgh Encyclopedia.

tively, but absolutely. Where the litter is thick and poor (as leaves) and left as closely trodden by the cattle, there will be no fermentation during the next summer, except near the surface.

Many have followed the practice of Taylor, (as described in his *Arator*) which was to carry out and apply the contents of the farm-yard without heaping, and in its unrotted state, for the corn crop, in the same spring in which the collecting and trampling the litter was finished. But this use of manure, however plausible in theory, seems to have pleased few, if any, in practice; and has been generally abandoned.

Another practice is to heap the manure of the farm-yard in the beginning of spring, in ricks of about six feet high, and as little compressed as the weight of the mass will allow—and as soon as its fermentation has half rotted the materials, or made them quite tender, the manure is carried out and ploughed in for corn. The mass begins to heat in a short time after being heaped, and in two or three weeks is fit for use.

It would be needless to point out the defects of each of these modes of applying manure, more particularly than has been already done incidentally; though in various respects, all are wasteful and faulty, when tried by the correct tests furnished us by science.

We have differed much more from our English teachers in the management of manure made in summer, (or from April to November,) by penning cattle without litter, and moving the pens as often as the space enclosed is sufficiently dunged. This practice was doubtless founded on any thing but correct views of manuring; and was solely recommended by its being an easy mode of enriching a small space. But slovenly as the plan is, it is less wasteful than would be penning on litter during summer, which, without unusual precautions, would produce the most violent and destructive fermentation. It is usually thought that much loss is sustained in the manure of summer cow-pens, by the labors of dung beetles in the early part of summer, and the complete exposure of the dung on the surface, to the hot sun: and to avoid this loss as much as possible, moving the pens frequently, and ploughing in the manure directly after, have been recommended or practiced by the most careful farmers. Yet many practical men, in opposition to this opinion, have pronounced that the dung not ploughed in, but left exposed through the summer, produced most benefit on the following crops. Absurd as this opinion has been generally considered, its truth is sustained by correct views of fermentation. The dung dropped in the heat of summer soon becomes a hard and dry mass, in which fermentation cannot begin for want of one of its necessary agents, moisture. The dung when thus dried is of a nature almost impenetrable to water, unless long exposed to it, and therefore the summer rains scarcely affect the surface of the separate masses, before they are again dry as before. All this is changed for the worse by ploughing in the dung. In its new position of four or six inches beneath the surface, there would be enough of both heat and air—and the earth below, aided by the exclusion of the sun, would furnish all the moisture necessary for the most speedy fermentation. The manure would soon begin to give out the last or gaseous products of putrefaction, and no growing plants would be present to

secure even the smallest portion of them, in their rapid escape into the air.

Earlier in summer, the dung beetles are supposed to destroy the greater part of the dung. They certainly bury it, and at great depths below the surface. But supposing the pellets, formed to enclose their eggs, to be carried down two feet, they are not placed below the reach of roots, and are better guarded from fermentation than if buried by the plough. I therefore do not admit the truth of the loss charged to these insects: but rather consider them as a means for preserving manure from waste.

Proposed means for lessening the loss from fermentation.

The various causes of the loss of the valuable principles of manures, and the avenues through which they are always escaping, have been described perhaps at tedious length—and yet much more space would be required to show in detail all the important losses we in this manner sustain. Every one may himself examine his own uses of manure, and at least learn to avoid some of the errors, by applying to his practice the tests which I have presented. But though we may thus gain incalculable benefit from consulting the theory of the fermentation of manures, still many of the causes of waste must continue to operate, in spite of all that science can direct, or care and industry can perform. Fortunately however for the fertility of the earth, bountiful nature offers to the soil much more than it is deprived of by fermentation: and however great may be the losses sustained, still the gains are far greater. The few elements that compose all putrescent manures, and the food of all growing plants, also serve to form water and atmospheric air, and therefore are always present in abundance. Water is composed of hydrogen and oxygen—atmospheric air is a mixture of oxygen and hydrogen gases, and always contains carbonic acid gas: and these substances are also the elements that form every putrescent manure, and serve to feed every plant. But air and water cannot yield their elements to serve directly for the nourishment of plants; or otherwise the supply of their food would be equally abundant every where, and soils would require no manure, to show the greatest and the most inexhaustible fertility. Still nature must enable plants to draw indirectly upon this immeasurable fund that air and water contains of the elements of their food, though the manner cannot be traced. Perhaps the moisture and carbonic acid which the leaves certainly absorb are used to compose so much of the substance of the plant—that the leaves exert this power and retain the fruits according to their size, vigor, and number—but that their growth and consequent power to absorb additional sustenance from the atmosphere, depends upon the amount of food drawn in by their roots. This, I admit, is merely supposition: but it is only by some such hypothesis that we can account for plants returning to the earth much more food for succeeding plants than they had drawn from it, and yet their growth being restrained and regulated by the fertility of the soil. Soils under good husbandry, though yielding half their crops for the use of man, retain their rate of productiveness, or grow richer by receiving as manure the remainder of what they have yielded: and most good soils however reduced by tillage,

will recover their first fertility by being left long enough to receive the natural supply of leaves and stalks of the plants which may spring and grow upon them, though much of that supply must necessarily be wasted by exposure. We may then suppose that nature aids our operations in a high degree, whether we work to dissipate and waste our manures, or use the proper means to increase the food of plants, and the productiveness of the earth.

In attempting to devise rules for the most economical and beneficial use of putrescent manures, it is necessary to inquire what ingredients they contain soluble in water, and therefore fit for the present food of plants, and what are the successive products made soluble by fermentation. More especially do we need the aid of the chemist for this branch of the subject, and in the absence of that aid, it must be very imperfectly treated. Nevertheless, though these soluble products may in great measure remain as unknown quantities, our reasoning respecting them will not be the less sound. The great object with the farmer should be to use all the ingredients of his manures as soon as they are successively made soluble by fermentation—and to avoid waiting for any until they assume the gaseous form.

The first effect of fermentation on hard and coarse vegetable substances, is to break down their texture, and make them more yielding and tender: a subsequent effect is to make them soluble in water—and the last is to convert them into elastic gases. Many intermediate stages exist, and are different in number and character according to the substances acted on: but we may consider every putrescent substance, or its principal part, to be at different times in these three stages—1. The solid and insoluble. 2. The soluble—and 3. The aeriform. In the second stage only is manure useful to growing plants—the first is certainly useless, and sometimes hurtful—and in the third stage, the manure is lost if not absorbed by the roots as fast as it becomes aeriform. No one substance, however homogeneous, can pass with all its parts through these stages: its more putrescent parts may arrive at the gaseous state, before the most hard and inert have become soluble. Still more is this difference exhibited in a dunghill, or a body of manure composed of various substances, of all grades between the most and the least putrescent. Some will be passing away in gas, before the woody fibre of others have begun to yield in the least. But still there is a counteracting operation in a well mixed bulk of various putrescent substances. The matters soonest fermented, though they partly escape, yet they also act like leaven, to hasten the fermentation of less putrescent substances—and these in their turn perform the same office for the slowest and hardest. This I consider is the most valuable result gained from mixing and heaping manures: and it is obvious that the greater the variety of substances of different natures, and the more intimate their mixture, the greater will this benefit prove. The manure from stables, and other still richer substances, if heaped alone, will suffer greatly from the violence and irregularity of the fermentation: but if carefully mixed with the coarser and more inert contents of the farm-yard, the fermentation of the last will be quickened, and the first moderated.

The foregoing exhibition of my views was pre-

pared for publication more than two years ago, and has not since been changed, except in mere form. This delay was caused by an unwillingness to present theoretical opinions so little sustained by practical proofs—and with the intention of endeavoring to present some of those proofs. A partial and imperfect, though extensive and laborious course of experiments for this purpose, was carried on, and reported in the *Farmers' Register*, Vol. I. page 136 to 142. With all the errors and improper management in these practical operations, and the consequent losses there reported, the facts serve to support the theoretical views here presented. Neither have my later practical operations, (which however have been necessarily wanting in regularity and method,) induced any change in these views—and for this reason—that they consist principally in exhibiting errors of opinion or practice, which may be known and proved, without our being yet able to avoid them, or being immediately thereby instructed in the most proper and economical course of management. Later experiments and observations on the fermentation and application of manures, and additional views thereon, may be hereafter presented: but now it is proper for me to wait to hear from others on these subjects, before occupying more space with matter which is readily admitted to be crude and imperfect—and which can scarcely be otherwise until the opinions and labors of many persons are brought together to investigate and discuss this most important branch of husbandry.

J. B.

EXPERIMENTS IN THE CULTURE OF POTATOES.

Extracted from a Report on the Agriculture of the county of Carlisle, in the [British] Quarterly Journal of Agriculture.

The usual mode of planting the potatoes is as follows. The dung being previously carted out in small heaps and parallel rows at convenient distances, the ploughman marks out a drill, and in the second course of his progress, forms and clears it perfectly; women with the potato sets in little bags or aprons tied to their waists, take certain distances, or lengths, of the drill, and in these deposite the sets about 9 inches apart, in a single row. The dung is forked over them by men, who have also certain lengths of drill within their charge: the ploughman, when not employed in opening drills, covers up those already formed and planted. The good farmers afterwards roll the drills flat, but by the ordinary class of husbandmen, this operation is neglected, as is the process of paring away the clay previously to a complete weeding and earthing up of the young plants, which are too frequently covered up on their very first appearance above ground. Two, and sometimes three, good earthings take place, and, as far as fallowing and cleaning the ground are in question, these earthings are very beneficial; but as regards the produce, the advantage of them is problematical, as may appear from the experiment of Mr. John Robertson before alluded to. I consider the subject an interesting and important one, and shall detail its particulars at length.

Experiment 1.—Mr. Robertson marked off, on an average portion of his potato ground, four drills, twenty yards each in length; in two of these he

planted potato seed of the red-nosed kidney species, and in the remaining two of the apple kind. These he earthed up in the usual way: in these earthen drills the produce was 6 lbs. (about 10 per cent.) less than in four corresponding ones unearthened. In all those drills (which were 30 inches apart,) the sets were placed from 10 to 12 inches asunder. The treatment of the unearthened drills may be thus stated: they were dug at bottom 12 inches deep, and left half full of the crumbling clods; on these the potatoes were laid, and then covered about three inches with dung, over which an inch of fine earth was drawn. When the shoots were sufficiently high the clods were broken fine and closed about the stems, and the ground in the intervals dug deep and fine as possible, and left perfectly flat; this was the only tillage which the unearthened potatoes received. The produce was about 150 barrels* to the acre.

Experiment 2.—In order to determine at what distance in drills 30 inches apart, it is advantageous to plant the sets, Mr. Robertson proceeded as follows:—

In a piece of ground of sixty square yards (not yards square,) he planted eight drills of a new seedling cup potato at 30 inches distance; these drills, nearly 9 feet in length, he planted at the distance above stated as follows:

Drill 1	the sets	9 inches	apart,	and 1 shoot	left.
do. 2	do.	9	do.	do.	2 do.
do. 3	do.	12	do.	do.	1 do.
do. 4	do.	12	do.	do.	2 do.
do. 5	do.	16	do.	do.	1 do.
do. 6	do.	16	do.	do.	2 do.
do. 7	do.	18	do.	do.	1 do.
do. 8	do.	18	do.	do.	2 do.

The produce was—

				Brls.	St.	Lbs.
Drill 1	do.	do.	do.	0	6	2
do. 2	do.	do.	do.	0	4	7
do. 3	do.	do.	do.	0	3	1
do. 4	do.	do.	do.	0	4	3
do. 5	do.	do.	do.	0	3	6
do. 6	do.	do.	do.	0	4	7
do. 7	do.	do.	do.	0	3	3
do. 8	do.	do.	do.	0	6	1

Gross produce, 1 15 2

Which is about 228 barrels, or 28 tons 10 cwt. to the Irish acre, accurately weighed. This enormous produce was from an alluvial soil light and deep.

Experiment 3.—To ascertain the result of giving unlimited room to the potato, and the depth to which the roots would run if unrestrained.

On a piece of ground trenched upwards of three feet, Mr. Robertson planted eight whole potatoes, each three feet apart in the row, with unlimited room to grow at each side. The produce was six stones, and the fibres were traced downwards 3 feet, the space they occupied being equal to that of two drills in Experiment 2.

Experiment 1 proves the inutility of earthing.

Experiment 2, gives an interesting demonstration of the advantage of free access of air, the outside drills giving such superior produce, and the

advantage (25 per cent.) of the double stemmed ones over the single, at the same distance, proves (combined with the other circumstance) the truth of Mr. Knight's theory, that, in proportion to the abundance of its foliage, and the free access of air and light, will be the productiveness of the potato.

From the similarity of produce in the corresponding drills of Nos. 2, 4, and 6, and in Nos. 3, 5, and 7, it would appear of little importance at what distance the sets are placed in the drills, provided they have sufficient room to spread at each side, and the extent of this must be regulated by experience.

It is of the highest importance, however, that the ground should be deeply worked and highly pulverized; for the potato fibre is extremely delicate, and cannot penetrate through a hard unyielding soil, though it will run freely through that which is loose, and occupy the pulverized intervals between the drills.

Mr. Robertson deems it highly absurd, in shallow soils, to heap on the top of the potatoes, where it affords no nutriment, the earth which, if left within the range of fibre, would feed it. However, it is to be remembered, that *some species* of potatoes strike upwards, *cups* for instance, (though it appears that Mr. Robertson used these in this experiment,) and in such case earthing is probably most useful. *Apple* potatoes have a downward tendency, and therefore may not require moulding. The species under culture, and the nature of the soil, should also materially influence the farmer as to the disposition of the manure under or over the set. It is obvious that (on a dry and porous soil in particular) in the culture of *cup* potatoes, the vegetating tendencies of which are to the surface, it is injudicious to place the manure under the sets.

The Carlow farmers in general place the potato set under the manure, by which mode the young plant has a nutritious, warm, and protecting covering, during its incipient growth. The average produce of the *poor* man's potato crop, however, from want of adequate manure, and from the continued exhaustion of the ground, is not 80 barrels to the Irish acre.

When we read of the produce obtained by Mr. Robertson, and of the *enormous* quantities raised by Mr. Knight, it is truly lamentable that the poor Irish farmer who most needs the supply falls so miserably short of it.

FRENCH WEIGHTS AND MEASURES.

[The following account of the plan of the modern French weights and measures, will be necessary for the readers of many of the articles translated from the French for the Farmers' Register, and may be useful for general reference. It is extracted from different parts of Brewster's Edinburgh Encyclopædia.]

French measures.

On the 1st of August, 1793, the National Convention resolved to adopt an uniform system of weights and measures; and, in the year 1796, a new system was established by law, which had been drawn up by the Academy of Sciences, who were entrusted with the prosecution of it by the Constituent Assembly.

The fundamental unit of the metrical system of

*The Kilkenny barrel contains 20 stone of 14 lb.

France is the *metre*, or the *ten millionth* part of the quadrant of the terrestrial meridian, from the equator to the north pole, which passes through Paris. This quadrant was found, by very accurate observations, to be 5130740 toises of six feet each, and therefore the metre is equal to three feet eleven lines, and $\frac{29}{1000}$ of the ancient measure of France. From the metre, all other measures of length are derived by decimal multiplication and division, thus,

Deca-metre is	=	10 times the metre	} By multiplication.
Hecto-metre	=	100 times the metre	
Kilo-metre	=	1000 times the metre	
Myria-metre	=	10,000 times the metre	
Deci-metre is the		10th part of a metre	} By division.
Centi-metre		100th part of a metre	
Milli-metre		1000th part of a metre	

French Linear Measure.

	English feet.	Old French feet.
Quadrant of the meridian	32809167.	30784440.
Centesimal degree	328091.67	307844.4
Myriametre	32809.167	30784.44
Kilometre	3280.9167	3078.444
Hectometre	328.09167	307.8444
Decametre	32.809167	30.78444
Metre	3.2809167	3.078444
	English inches.	French lines.
Decimetre	3.9371	44.3295936
Centimetre	0.39371	4.43295936
Millimetre	0.039371	0.443295936

French Superficial Measure.

The unit of the superficial or Agrarian measures of France, is the *are*, which is equal to 100 square metres, or a square decametre; and the following table is obtained from it by decimal multiplication and division, as before:

	English square feet.	French square feet.
Myriare	10764414.3923	9476817.46113
Kilare	1076441.43923	947681.746113
Hectare	107644.143923	94768.1746113
Decare	10764.4143923	9476.81746113
Are	1076.44143923	947.681746113
Deciare	107.644143923	94.7681746113
Centiare, or } square metre }	10.7644143923	9.47681746113
	English square inches.	French square inches.
Square Decimetre	15.500756	13.646617
Square Centimetre	0.15500756	19.651134
Square Millimetre	0.0015500756	0.19651134

The following subsidiary table will be found of frequent use.

The Are.	= {	136466.17144 square French inches.
		947.68175 square French feet.
		26.32449 square French toises.
		2632.449 square French toises.
		292.494 square perches of Paris.
The Hectare =	{	195.802 square perches for waters and forests.
		2.92494 square acres of Paris.
		1.95802 square acre for waters and forests.
		0.00051 square league.
The Centiare =	{	1364.66174 square French inches.
		9.47682 square French feet.
		0.26324 square French toises.

Measures of Capacity.

The unit, both of liquid and dry measures of capacity, is the *litre*, which is equal to a cubic decimetre. A Paris pint is equal to 0.9813177 litre, or 46.96 cubic inches.

	English cubic inches.	Paris pints.
Myrialitre	610280.	10737.47 = 3 muids 26 veltes 1 pint $\frac{3}{4}$
Kilolitre, or } cubic metre }	61028.0	1073.747 = 37 muids 10 veltes 1 pint $\frac{1}{2}$
Hectolitre	6102.8	107.3747 = 13 veltes 3 pints $\frac{1}{4}$
Decalitre	610.28	10.73747 = 1 pint and $\frac{1}{14}$
Litre, or cubic } decimetre }	61.028	1.073747 = 1 velte 2 pints $\frac{3}{8}$
Decilitre	6.1028	0.1073747 = $\frac{1}{8}$ litron
Centilitre	0.61028	0.0107374

Solid, or Cubic Measures.

The unit of the French measures of solidity is the *Stere*, which is equal to a cubic metre, and is therefore the same as the kilometre in a preceding table. It is used for timber and for fire wood.

	English cubic feet.	French cubic feet.
Decastere	353.1700	291.738519
Stere, or cubic metres	35.3170	20.1738519
Decisters	3.5317	2.91738519

French Measure of Time.

	New division.	Old division.
		h. m. s.
100 Seconds =	1 Second =	0 0 0.864
100 Minutes =	1 Minute =	0 1 26.4
10 Hours =	1 Hour =	2 24 0
	1 Day =	24 0 0

	Old division.	New division.
		h. m. s.
1 Second =	0 0 1.1574	
1 Minute =	0 69 54.4	
1 Hour =	1 15 74	
1 Day =	10 0 0	

French Measure of the Circle.

	New division.	Old division.
		h. m. s.
100 Seconds =	1 Minute =	0 0 32 $\frac{1}{2}$
100 Minutes =	1 Degree =	0 54 0
100 Degrees =	1 Quadrant =	0 0 0
400 Degrees =	1 Circle =	0 0 0

	Old division.	New division.
1 Second =	0° 0' 3 $\frac{1}{11}$ "	
1 Minute =	0 1 85 $\frac{1}{11}$ "	
1 Degree =	1 11 11 $\frac{1}{11}$ "	
1 Quadrant =	100 0 0	
1 Circle =	500 0 0	

After the preceding system had been established and enforced for 16 years, it was found to be pregnant with such evils and inconveniences, that the imperial government considered it necessary to yield to the wishes of the people, and to establish a modified system, more conformable to their ancient habits. It was therefore decreed on the 28th of March, 1812, that the ancient and respected names of the *toise*, the *ell* or *aune*, the *foot*, the *inch*, and the *bushel*, should be tolerated, but, with the view of preserving the metrical system, that they should represent new measures related to the metrical system in the following manner.

	Metres.		Metres.
Toise =	2	Aune =	1 $\frac{1}{2}$
Foot =	$\frac{1}{3}$	Bushel =	$\frac{1}{8}$ of a Hectolitre.
Inch =	$\frac{1}{12}$		

The *decimal* division of those tolerated measures was likewise abandoned, and the *duodecimal* one enjoined, on the express ground, "that the decimal division, though favorable for calculations, is not equally so for the daily operations of the people, and is not easily comprehended." The French have therefore two systems of measures, the one for philosophers and politicians, and the other for the

great mass of the population. We would recommend the careful study of the decree of 1812, to those who wish to establish the decimal division in this country, or to make any serious innovations upon the present system.

Weights.

The *gramme* marks the weight; it is equal to the weight of a cubic centimetre, of pure water, at its maximum of density. It has been found equal to 18.827 French grains, of which 5.76 make 472.5 English; and 489.5058 grammes make a pound of the standard of the mint at Paris.

Measures of Coin.

The standard coin of France is a piece of silver of the weight of five grammes, or five times $18\frac{1}{1000}$ grains, containing $\frac{1}{10}$ th of alloy and $\frac{9}{10}$ ths of pure silver, and very nearly the 24th part of the pound sterling metallic value, being nearly the same with the *livre tournois*: it is called a franc, and divided into decimes and centimes. There are pieces of five francs, two francs, $\frac{1}{2}$, $\frac{1}{4}$ and $\frac{1}{8}$ franc. The gold coins, like the silver coin, contain $\frac{1}{10}$ th of alloy and $\frac{9}{10}$ ths of pure metal. They are called Napoleon's d'or or octo grammes: an octo gramme of gold is worth 25 francs.

[The two next articles exhibit remarkable examples of the ascending force of subterranean water in one Artesian well, and of variations in that force in another. The facts stated may be useful to some of our readers, and perhaps will be interesting to all. The character of the calcareous earth through which the well of Rochelle was bored, as here described, seems to be very similar in appearance and character to the "rotten limestone" through which the Artesian wells of Southern Alabama are bored to depths varying between 800 and 600 feet.]

REMARKABLE HEIGHT AND FORCE OF ASCENSION OF WATER IN AN ARTESIAN WELL AT TOURS.

Translated for the Farmers' Register, from the *Annales de l'Agriculture Française*.

M. Degoussée, civil engineer and well borer, has completed the bored well which he had undertaken in the cavalry quarter of the city of Tours, at the joint expense of the city and of the war department.

This well exhibits a result, which until now is without example, both for the height of ascension and the volume of its water, of which the product is more than 1,500,000 litres in twenty-four hours.

The well, of 138 metres of depth, is bored in one of the most elevated quarters of the city, at 8 metres, 40 [centimetres] above the level of the canalling of the Loire at the bridge of Tours, and 58 m. 40 above the level of the sea.

Its diameter is 0m. 25 at the upper part, reduced to 0m. 090 at the lower part. It is furnished with iron tubes to the depth of 28m. 25.

The ascending flow, (which had been preceded by many sources yielding very little water,) was met with in a bed of green sand of 2m. 10 in thickness, at 123m. 50 deep below the surface of the earth, and 70m. 00 below the level of the sea.

The water is perfectly limpid; without taste or

scent: it dissolves soap well, and cooks vegetables perfectly. Its temperature is 17° 50 (centigrade.)*

The maximum of ascension of the water [or the highest point to which it rises] is 1st. 17m. 80 above the bottom of the basin of the Château d'Eau; 2nd. 18m. 80 above the surface of the ground; 3rd. 27m. 20 above the canalling of the Loire at the bridge of Tours, and 4th, 77m. 20 above the level of the sea.

After the bursting up of the water from its source, it threw out from the bottom of the boring, fragments of the green sand of the size of a large walnut. To try the repulsive force of the water, there were successively put into the upper tube, bullets of 4, of 6, and of 8; none of which could sink, but were immediately thrown out. A cube of greater diameter and of 0m. 65 in height having been put upon the upper base, there were placed on it successively twenty-two bullets of 12, which were all forcibly rejected: the twenty-second only remained stationary upon the orifice of the base.†

An important observation is the continued increased product of the five first wells bored by M. Degoussée in the city of Tours. The first gave only 30 litres of water a minute; the second 75; the third 173; the fourth 900, and the fifth, 1,100 litres. Thus these five wells give 2,273 litres per minute, or 3,280,320 in the twenty-four hours. It has scarcely been three years since Tours had only insufficient fountains, often dry part of the year, or only yielding water of bad quality. It is seen now that it obtains from these five wells, 3,280,320 litres of water each day; it has 22,000 inhabitants—which makes 149 litres and a fraction, or nearly 150 litres of water which each individual may actually use per day.

Since the completion of the new well in the cavalry quarter, the soldiers give the preference to its water, and consider it excellent. It has been also remarked that the horses, which were frequently disordered by the water of the old watering place, do not now suffer any indisposition of the kind with which they were formerly affected.

*The scale of the Centigrade thermometer, which is used in France, is so divided that 0°, marks the freezing point, and 100° the boiling point of water. To find what is the temperature as marked by the centigrade in degrees of Fahrenheit's thermometer (which is that used in England and this country) it is only necessary to multiply by 9, divide the product by 5, and then add 32. Thus of the 17° 50 above—

$$\begin{array}{r} 17.50 \\ 9 \end{array}$$

$$5)157.50$$

$$\begin{array}{r} 31.90 \\ 32. \end{array}$$

$$=63°.90 \text{ hundredths of Fahrenheit.—Ed. F. R.}$$

† "Un cube d'un plus grand diamètre et de 0m65 de hauteur ayant été placé sur la base supérieure, on y a successivement mis jusqu'à vingt-deux boulets de 12, qui ont tous été rejetés avec force; le vingt-deuxième seulement est resté stationnaire sur l'orifice de la base."

These important results go to change entirely the state of industry of the city of Tours; such a bored well giving a continued power, secure from frost and drought, which without exaggeration, may be counted equal to the motive force of two horses.

HERICART DE THURY.

February 5, 1834.

ACCOUNT OF THE VARIATIONS OF THE HEIGHT OF WATER IN THE ARTESIAN WELL OF THE SEA BATHS OF ROCHELLE.

Translated for the Farmers' Register, from the *Annales de l'Agriculture Française*, for March, 1834.

During the four years which have passed since the bored well of Rochelle was undertaken, the water had remained constantly, until the 1st of last August, at 22 or 22½ feet below the level of the surface soil—the same height very nearly of the water in the neighboring wells.

At this time, they recommenced boring in this well: 28 feet more of depth were given, which made its whole depth 555 feet: on the 31st, it was perceived that part of the stems which before had sunk into the water, came up dry; and the next day, September 1st, the work being suspended, it was seen that the water had sunk 144 feet. On the 2nd, this fall was 152 feet. But on the 4th, the water began to rise again, and rose 6 feet—and its ascension continued for a month. Its daily rise, on an average, was 6½ feet during the first 15 days, and 3 feet 8 inches only for the last fifteen. The water returned precisely to its former height of 22 feet below the surface of the ground.

The next day, October 3rd,† it began again to descend, and on the 4th, it had sunk 29 feet.

The 6th, a new rise commenced and continued to the 15th. This was only 9 feet altogether, or from 9 to 10 inches a day.

But on the 16th, the water fell 93 feet; 11 feet on the 17th, and 36 on the 18th; in all 140 feet in three days. Thus the column of water which before the 1st of August was 505 feet, was diminished by 160, or more than one-third of its height.

Lastly, on the 19th, the water remounted 4 feet—on the 20th, 5 feet—and yesterday, the 21st, the same measure.

We see that the descent of the water has been much more rapid than its rising. It should be observed also, that the well has been deepened 4 feet on the 17th, 18th and 19th, so that the total depth is now 559 feet, or 186 metres and 32 centimetres.

At this time the work is suspended, and for a long time perhaps, for want of funds, and in consequence of the discouragements met with.

It is of importance then to consult men versed in such enterprises, in order that they may judge whether it is probable that a little more of depth given will suffice to make this intermitting subterranean fountain show its waters at the surface of the earth.

We are lost in conjecture as to the cause of these

*† Both these months are called November in the original—but as the mistakes are evident, and the correction equally so, the proper alterations are here made.—TA.

singular variations. Mere cavities at 500 or 600 feet below the level of the sea could not suffice to explain this remarkable intermitting. Could it have been owing to these subterranean currents which Artesian wells are now every day bringing to our knowledge? Would one of these currents, made to communicate with the well by the boring in the month of August, pour its water into the well when the current is more rapid than common? and does its neighborhood offer a chance of success? We leave it to others to decide, reminding them that this well is bored in the argillaceous chalk of the middle *jurassique* formation; that 60 feet of it have been in a compact stone, of a yellowish white, almost lithographic, and 479 a bluish bed, much more argillaceous, of which we know not the bottom.

Last winter, the first 120 feet of the well were secured in tubes of cast iron, to exclude the percolation of water from the sea. Still the taste remains brackish. The well is fed by abundant sources, as we have made known in a notice upon its temperature, which has been inserted in the *Bulletin de la Société Géologique* of the months of May and November, 1830.

FLEURIAU DE BELLEVUE,

Correspondent of the Academy of Sciences.

Rochelle, Oct. 22, 1833.

RURAL ENJOYMENTS IN TOWN—REMARKS ON THE WRITINGS OF JOHN TAYLOR, OF CAROLINE.

To the Editor of the Farmers' Register.

New York, Nov. 22, 1834.

Enclosed is the amount of my subscription to your Farmers' Register, for the second year. I continue to read it with unabated pleasure—not only on account of the valuable agricultural information it communicates, but because it carries me back in imagination, to the rural fields and rural occupations among which I passed my early years. At that time I scarcely knew the inestimable value of the calm quiet pleasures of a country life: but time and experience, in various scenes and occupations, have taught me properly to estimate the innocent enjoyments derived from an association with the flowers and the fruits of the earth, and the harmless populace of the fields and woods.

I delight to think, and talk, and write about these matters, in the midst of a great city, in whose business I take but little part, and whose pleasures are little to my taste. I have called around me all the illusions which might nourish the idea of the country, that the limited space allowed in a part of the city where every foot of land might sell for as much as would nearly cover it with silver dollars, will permit. In spring and summer the brick walls of my grounds, are overrun with creeping vines, that hide them almost entirely from view, and hedged by lilacs, snow balls, and rose bushes, of various kinds. I have an Isabella grape vine, which hangs in festoons from one pillar to another of the back piazza, which extends fifty feet along the rear of my house, and in the season is loaded with bunches of purple grapes.

I have a grass plot of about eighty feet by thirty-five, from which I cut a crop of hay three times

a year, which I give to the mower, together with half a dollar for his trouble: so you see I don't make much by this branch of my rural economy. In the summer mornings and afternoons, when the grass is shaded, my children play their gambols on it, while I sit under my piazza like a patriarch, smoking a segar, and enjoying their pastimes. In the centre of the grass plot, are two beautiful and luxuriant moss rose bushes, on which I have counted two hundred roses and opening rose buds, banqueting on the dews of the morning at one time. But every thing in this belligerent world has its peculiar enemy, and my rose bushes are every spring assailed by certain moss-trooping worms, that eat into the buds, and blight their opening beauties. Against these I have declared open and exterminating war. But what could even the great Gulliver do against an army of Lilliputians? As fast as I dislodge one enemy, others appear in its place—for it would seem that the more worthless the animal, the more rapid its reproduction. If any of your numerous correspondents will favor me through the medium of the Register, with a treatise on the art of warring against caterpillars, he shall have the first rose of the spring, and my thanks besides.

But I have reserved my most valuable possession for the last. It is a magnificent trumpet creeper, which runs up and completely hides from view the gable end of a three storied house that adjoins my premises. In the season it is covered with flowers three inches long, and here I have often counted a dozen humming birds, extracting the sweets with their long bills, and all at once suddenly darting at each other, for no possible provocation that I could conceive. Like almost all little folks, they seem exceedingly pugnacious about nothing, and I have often seen a couple of these diminutive prize-fighters fall to the ground clinging to each other with most alarming ferocity. Where they come from, or whither they go, I cannot conceive, for they appear and disappear like the glances of sunbeams. In front of my house I have a row of plane trees planted close to each other, so that their limbs interlock, and being suffered to grow low towards the ground, hide from view the opposite buildings, and give a rural air to my residence. Looking out of my front windows, I see nothing but green trees, and if I go into the back parlor, nothing but vines and shrubs; so that were it not for the racket in the streets, I should almost realize the country, in the midst of a great city.

Thus have I given you a sketch of my city plantation, and rural system of economy. I trust you will give me the credit of being a capital agriculturist, and most judicious experimenter, since I can assure you on my veracity, that though I lay out money every year in improvements, I never receive any in return. This is what I should call being a gentleman farmer. I have studied Taylor's Arator, as you will perceive from this confession, with more pleasure than profit.

By the way, I have a book from the same hand, called "An inquiry into the principles and policy of the government of the United States," which I consider the most profound political work this age has produced. I wish to heaven our statesmen would study it a little more than I suspect they do, for to my mind, it would be worth more to them than all the precedents in English history,

and all the examples of Greece and Rome. I desire to know a little more of this John Taylor than I have been able to learn, and cannot but think that a sketch of his life would be peculiarly appropriate to the columns of the Farmers' Register. As an experienced farmer, and a most efficient champion of the agricultural interests, against the inroads of paper money and paper phantoms, he deserves a biography much more richly than nine-tenths of the mushroom maggots of the past, present, and future. Pray call upon your correspondents to do this last act of justice to old Arator. Virginia owes him this act of duty and gratitude.

J. K. PAULDING.

[We accord entirely with the foregoing opinions respecting John Taylor, of Caroline. While we have heretofore expressed our dissent to some of his leading doctrines on the improvement of soils, we have always held and expressed the opinion, that agriculture in Virginia—indeed the *commonwealth* of Virginia—owes more gratitude to John Taylor, for valuable and enduring services, than to any other individual whatever. It is not merely on his merit as an instructor in the art of agriculture that our estimate of his services is founded—great undoubted as was his merit in that respect—but still more on his able and more efficient maintenance of the rights and interests of agriculture, without which, all increase of products and profits are nothing to the tillers of the soil—for the toil will be theirs, and the rich harvest be seized and devoured by others. Holding these opinions, we have wished, (and had already taken some steps for the attainment of the object,) to be enabled to publish a biographical sketch of the life, and a review of the writings of John Taylor, as an agriculturist and defender of agricultural interests: and if the task is not performed by some one better qualified, it will at some future time be attempted by our pen, though bringing no other requisites for the performance than veneration for the individual, and zeal for the maintenance of the objects which he first advocated. The *Inquiry into the principles and policy of the government of the United States*, which is referred to above by our correspondent, is decidedly the *great work* of Taylor—one which contains enough of new and important truths to supply with matter twenty other works—or to make the stock in trade, and perhaps the political fortunes of one hundred (*soi disant*) statesmen. It deserves indeed to be termed the *Philosophy of Free Government*. Yet this work has been so little read and noticed, that it may almost be said to have fallen dead from the press. But the time must come when it will be properly valued, though perhaps, like the prophecies of Cassandra, when too late to profit by its warnings. Besides other circumstances which concurred to condemn this work to general neglect, a principal cause was the unfortunate obscurity of the written language of the author—for which he was as much distinguished as for his profound and original thinking. In both these respects, he may well be compared to the great Bentham, whose works required to be translated into the French of Dumont, to be made intelligible to his English readers. The American

Dumont who will methodize, and translate into plain and clear English the substance of Taylor's *Inquiry*, will acquire fame for himself, as well as for his author, and render a most important service to the interests of our country, and of free principles in general.]

For the Farmers' Register.

ON THE ROAD LAW OF VIRGINIA.—NO. 2.

In the preceding No., I exhibited the inequality and injustice of the tax imposed by law, for the repairs of public roads, and stated generally, that those whom the law intended should bear the whole burden, contrived to shift the greater part to the shoulders of those whom the law proposes to exempt. In this way, something more like equity has been reached: but in so awkward and expensive manner, that the tax now levied is imposed as a barren penalty, and not in aid of the public service. Those who use the roads, pay indeed a heavy tax, on account of their bad state—instead of its being in money or labor, to repair the road, the tax is levied in the cost of extra team, worn and broken carriages, and labor lost entirely. What this kind of taxation amounts to, it is impossible to estimate: but this I am sure of—that on the average, every load that I send to, or bring from my market town, requires one-fourth more team, and that the mishaps to the wheel carriages used, are thrice as many in number and cost, as would be on good roads—and (though not belonging to the privileged class, exempt by law,) that this part of my road tax is much more costly than that which is paid, because required by law. Perhaps most farmers and slaveholders might say the same. I should like to hear an estimate on like grounds, from some person who owns road wagons or stage coaches, regularly employed on our common bad roads—and should not be surprised to find that these carriages alone, on some of our roads, paid more in *losses*, than the fair price of all the labor actually applied for repairs.

Let us now proceed to consider how the labor, or the *legal* road tax, is usually applied.

Road making is an operation which requires much judgement and skill—but neither judgement, skill, nor any kind of knowledge whatever, is required, or considered necessary in the usual appointments of surveyors of roads. The office is burdensome and disagreeable, and is avoided by most persons. It is, therefore, often put upon some youth who has no acquaintance with any kind of labor, and who assumes the duty merely because he wishes to exercise this little authority, and hold even this humble public office. More often, it is given to some man because he is so poor, that the few dollars allowed for the service will be very acceptable, and of far more value than his private business for the same length of time. Such a person is most generally, and very naturally, destitute of all knowledge of the principles of road making—unused, and therefore unfit, to command the slaves placed for a day or two only under his authority—and having very little interest in the economical use of the labor, or the effect produced by it on the state of the road. Under such direction, it might be anticipated that even a good road law (in other respects) would be rendered inefficient; and under our very bad

law, the practice is well suited to the principle and theory.

When the road has been so washed and gullied as to be almost impassable with ordinary loads at some particular places, the surveyor begins to think that it may possibly be considered by the grand jury as *not in the condition required by law*—and to avoid the danger of a presentment and fine, he summons the laborers. The time selected, is generally the last Saturday, or the day before the sitting of the grand jury—as one day, or at most two, will permit all the usual labor to be given to four or five miles of road. In Eastern Virginia, the roads need very little labor, (if that little was judiciously applied) except to keep off the overflowing water of rains, and more rarely of springs. In other words, the roads require but little more than being kept properly *drained*. But an utter ignorance of the principles on which draining should be conducted, is exhibited in almost every job of what is called road mending. The requisitions of the law are so uselessly and foolishly strict, that it is almost impossible for any surveyor to comply with them; and hence the useless requisitions first become neglected and overlooked as a dead letter, by sworn grand jurymen—and next, as a necessary consequence, the useful and necessary parts, follow into a state of like neglect and contempt. Instead of every public road being kept “thirty feet wide at the least,” not one is fifteen, if even ten feet for five miles together. If only twenty feet had been required on all except the most public roads, that width might have been maintained, and the duties of surveyors and grand juries kept better in view. But by requiring so much, in this and in other things, a general permission is assumed to forget the law almost entirely. Wheel carriages follow each other usually in one track, and where there is any descent, the rain water, following the ruts, first serves to wash gullies, and, as they are filled, gradually causes the depression of the whole road. If necessity compels, this gutter or ditch-like road is kept wide enough for two carriages to pass (though never thirty feet)—but in roads not very much used, such places are often not wide enough for the passage of two carriages. The more the road is travelled, and the more it is repaired, (in the usual mode) the more it approaches in form to a ditch, and is washed by torrents at declivities, or kept in pools of water, or quagmires, or level ground.

I do not mean to assert, that there are no attempts to prevent these effects of water—and it may be even admitted, that the labor used, if properly applied, might go far towards effecting the object. But in most cases, the labor is so ignorantly, imperfectly, and inefficiently directed, as to be of but little avail.

It should be remembered, that all our roads were first made by merely cutting down the trees on the track through the woods—then, and then only perhaps, it being the thirty feet wide—and that to avoid the stumps and bared roots as much as possible, the horses and carts followed each other in one track. By the time the stumps had generally rotted, this track was becoming a trench, and the higher margins formerly cleared, had grown up in bushes large enough to prevent its forming part of the road—except in the statute. In former days, our fathers used almost no farming im-

plements except axes, grubbing hoes, and broad weeding hoes. These only were the tools brought by laborers to assist in repairing roads—and the same usage continues (in Lower Virginia) without material change or improvement. Whatever then is done towards shaping or draining the road, is done by some of these few and inefficient utensils—and so accustomed are we to this old usage, that almost no use is made (indeed the want is scarcely thought of,) of either the plough or spade, cart or scraper, for repairing roads. Yet the superior value of horse labor is not greater in cultivating our fields, than it would be in repairing roads.

Well—with axes and hoes only, the roads are to be shaped and drained. Where a gully has been washed from one to three feet deep, it is the quicker job (and will serve as well for the next grand jury) to fill it with green pine or cedar boughs, and cover them over with earth. This was very easy formerly, when one or both sides of the road was covered with trees—and so strongly do we hold to old practices, even after the causes and facilities have disappeared, that the surveyor now often sends the axe-men 300 yards off to cut bushes, and then drag them to the gullies. These bushes, no matter how compactly put down, or how well covered with earth, will sink, and soon or late must rot: the depression draws the currents of rain water to the same channel, and the gully is again washed out. The proper course would have been to fill with earth only, (unless the better material stone was convenient) and to use a plough to dig, and either carts, wheelbarrows, or a scraper, to move the earth. The trodden track cannot long spare even the little earth which is used to fill gullies—and if the margin, from which it is obtained, is twelve or fifteen feet distant, the earth, after being dug by grubbing hoes, is thrown or dragged that long distance by weeding hoes. So much for the shaping—now for the draining.

If the roads in our generally dry, level, and sandy soils, were shaped so as to rise slightly in the middle, and all running or overflowing water was kept off, there would be scarcely any repairs needed: and when required, if they were given properly, with a view to these ends, the repairs would not only be far more efficient, but cheaper than now. Remember the tools used—the ordinary want of knowledge to direct—and the very inefficient laborers withal (to which I shall advert hereafter)—and the result of the draining operations may well be anticipated. To divert the water from running along the middle of a road down a hill, a pole is laid diagonally across the level road above, to turn the rain water to the side of the road, and a ditch is lead it down that side is dug by grubbing hoes, and scraped out with weeding hoes. The pole which is to serve as a dike, is a much greater obstacle to wheels than to torrents of rain. The ditch leading from it is perhaps a foot deep and not much wider, and after being carried along the side of a road cut down by long continued washing, the bottom of the little ditch is higher than the road, or large ditch. The road on the level land above, being also deeper than its margins, collects a torrent in heavy rains, which sweeps over the pole and down the road as before, and with like injurious effects.

To prevent mires from oozing springs, or from standing pools of rain water, the usual operations

are equally injudicious and ineffectual. As to mires in clay soil, caused by rain water being retained and trodden in by the travelling, most surveyors consider *that* to be no business of theirs: "they could not prevent the heavy rains falling, and enough water will of course make a clay road miry"—and the evil is left to be remedied by the dry winds of the next March. But when a permanent mire compels the repair of some particular spot, the usual means is to make a "causeway" of round poles, forming upon a small scale, what in the South are sometimes called "corduroy turnpikes" and "Carolina rail-roads." I am not objecting to these wooden coverings for a wet surface, where water cannot be kept off, (as in swamps subject to inundation,) but they are resorted to when other means would be much less troublesome, and far more efficient. Wetness from a small spring oozing out of a hillside and spreading its water over a clay road is often remedied by a laborious "poling" of this kind, when a trifling side drain would have kept the water from reaching the road. Sometimes "mud holes" are cut into a level and generally firm road, by the wheels plunging in heavily—and every time bringing out some of the mud, so as to keep the reservoir for water enlarging. A few cart loads of gravel, or even sand, would fill and permanently cure one of these mud holes—but as the use of a cart seems to be out of the question, these holes are either filled with similar earth, which being thrown into the water, makes a fluid mire that will not become dry for months, (even if it should not be soon conveyed away by sticking to the wheels which pass through,)—or a more energetic surveyor will cover the spot with poles which form traps to catch horses' legs while they remain, and after rotting, leave the spot fitted to form another mud hole.

These may be extreme cases of ignorant waste of labor. But though the manner of repairing roads may be, and doubtless is, very different in different places—and though some surveyors exhibit proofs of their intelligence, and ability to make good roads under a good law—still it will not be denied that every county, if not every surveyor's district, will furnish facts such as are here stated. The want of proper utensils for road mending, and the want of knowledge to direct the operations, would serve to cause a waste of much the greater part of the labor applied, even if there was no want of industry in the laborers. But the want of industry, in addition to all others, is so great, that two days' labor on the road is scarcely equal to one at home. The surveyor eats his breakfast at home, and then rides or walks some miles to the place to begin work. The laborers would be without orders, and of course would do nothing if they were to come earlier—and so long has this state of things continued, that if a surveyor was to order early meetings on the road, and to go himself by sunrise, he would wait two hours perhaps before a laborer would appear. Of course no strict discipline can be exercised where so many laborers are brought together, scarcely known to their superior, and to remain but a day or two under his direction. The whole business is to the laborers a frolic and half holiday—and if they perform 4 or 5 hours work in a day, it is as much as can be expected. Hence, in addition to all other and greater evils in the system,

there is a certainty of this—that the tax in labor is not half applied to its intended object, and the balance is thrown away.

Since writing the foregoing observations, I have seen in the last papers, that a petition has been presented to our legislature for a change in the road law. I am rejoiced that the subject has been thus brought up for discussion—and without being informed of what changes are sought to be obtained, I heartily wish success to the petition, for two reasons—1st, because I believe that it is very improbable that any change for the worse can be made—and 2ndly, if this very improbable event should occur, it is as easy in Virginia to put down a legal oppression while new, as it is difficult, after it has become a “time honored” usage.

R. N.

SPADE HUSBANDRY—EMPLOYMENT OF THE POOR IN GREAT BRITAIN.

[The following is an interesting article, although the time may never arrive when the low price of labor, and the high prices of land and of its products, will justify such practical operations in this country—at least, for field culture. If Mr. Scott's views are correct, and his example should be extensively followed, an important change will be produced in the political as well as the agricultural state of Great Britain. But without regard to these considerations, it is an important fact in agricultural science, and it seems well established here, that the loosening, and reversing of the position of a deep and strong soil to the depth of fourteen inches, was not only found beneficial, to cleanse and prepare the land for a wheat crop—but was more effectual than the very laborious and expensive summer fallow usual on the rich and stiff Lothian soils, where that operation has been considered as the most perfect, and was the boast of Scottish husbandry. Mr. Scott's summer fallow, as stated below, had six several ploughings (on “furrows” as there called,) besides suitable harrowings. Supposing the objection of the British editor to the high price of these ploughings to be well founded, there is another charge which might be well made against these repeated summer ploughings, and which is not mentioned. This is the decomposition and waste of vegetable and nutritive matter in the soil, which we suppose must take place to an injurious extent, where the soil is so often stirred and turned—and which is avoided in the later single, and much deeper operation of trenching by spades.]

Extracted from the Quarterly Agricultural Report in the Edinburgh Quarterly Journal of Agriculture, for September 1834.

The state of the laboring poor in England attracts universal attention. The grievous thing for English laborers is the want of employment. Many plans have been devised to create employment for them. Among others, a clergyman of the Church of England, the Reverend C. Gardner, offered a premium of £100 to be given to any person who can devise a better plan than the present poor law of Scotland for finding employment for the surplus laborers of England. The following letter on the subject, written by Mr. Archibald Scott, tenant at Southfield, near Haddington, in East Lothian, was we understand, found entitled to the reward. Mr. Scott, as will appear

from perusal of the letter, chalks out employment to laborers by trenching with the spade the ground in autumn, which is usually devoted to fallowing during summer. Upon this ground, with very little manure, he raises a good crop of wheat. We must allow our agricultural friends to judge of Mr. Scott's plan for themselves. Our duty is to place facts before them, and it is theirs to draw conclusions from them. All that we shall say is, that we have seen this year's crop of wheat raised as described by Mr. Scott, and can attest its prolificacy. Mr. Scott's letter is dated Southfield, 8th March 1834, and addressed to the Rev. C. Gardener. He says,

“On glancing over last week's newspaper, I observed £100 reward offered for any better plan than the present poor law of Scotland for finding employment for the surplus laborers of England, consequently making bread plenty, corn laws useless, enriching farmers, raising fallen rents, finding a home market for manufactures, and saving Irish industry, the check of poor laws.

“As I certainly felt very much gratified on perusing the advertisement, I determined to forward to you my views on the subject; not that I had any expectation of being entitled to the reward, but because I consider your liberal offer entitles you to every information on so very important a subject.

“It is impossible, for me at least, to offer any improvement on the present Scotch poor laws, and as I presume you are thoroughly acquainted with their workings, I shall forbear any further remark than simply to state that only the aged, the sick, and the infirm derive any benefit from them; and that the able-bodied laborer, though he may find it impossible to obtain work, has no claim to parochial relief. This, I think, is just as it should be, and is in reality a great blessing to the Scotch peasantry; they are, in consequence, trained up with notions of independence, as they are aware that they have themselves, and themselves alone, to look to for support, and the knowledge of this makes them prudent, industrious, and economical.

“Notwithstanding all this, I am quite aware that there are many cases of great hardship and great individual distress, at particular seasons of the year, from want of employment; but this, I am afraid, cannot be satisfactorily remedied by any system of poor laws or legislative enactments; it is the landed proprietors and their tenantry who alone can do it, yet it becomes an object of paramount importance to the landed interest of the kingdom.

“I am quite convinced there is but one way of employing the surplus population of England and Ireland, and that is by a judicious introduction of spade husbandry; and I am also convinced that a system of management can be pointed out whereby every laborer of Great Britain might be employed with profit to his employer and advantage to the country.

“I should think it will hardly be denied by any one at all versant in agricultural operations, that work done by the spade is superior to work done by the plough, and that the only drawback is the great additional expense. Now, if I can show that, at a particular period of the rotation, spade husbandry is not only superior, but less expensive, I shall have got over this difficulty.

“To show that I am not a mere theorist, but a practical man, I may mention that I rent a farm from the Earl of Wemyss in East Lothian, con-

sisting of 530 Scotch acres; that I have cultivated land to a considerable extent with the spade for the last three years, and that the result has exceeded my most sanguine expectations. 'As facts are stubborn things,' I shall lay before you my system, crops, expense, and profits.

"In 1831, I determined to ascertain the difference of the expense and produce between trenching land with the spade, and summer fallowing with the plough in the usual way: I therefore trenched thirteen acres of my summer fallow-break, in the months of June and July; I found the soil about fourteen inches deep, and I turned it completely over, thereby putting up a clean and fresh soil in the room of the foul and exhausted mould, which I was careful to put at the bottom of the trench: this operation I found cost about £4 10s. per Scotch acre, paying my laborers with 1s. 6d. per day: the rest of the field, which consisted of nine acres, I wrought with the plough in the usual way, giving it six furrows, with the suitable harrowing. I manured the field in August; the trenched got eight cart loads per acre, the ploughed land sixteen; the field was sown in the middle of September. The whole turned out a bulky crop as to straw, particularly the trenched portion, which was very much lodged. On thrashing them out I found them to stand as under:

By trenched wheat per acre, 52 bushels at 6s. 9d.	£17 11 0
To two years' rent at £2 10s. per acre,	£5 0 0
Expense of trenching,	4 10 0
Seed, three bushels at 6s. 9d.	1 0 2
Eight cart loads of manure at 4s.	1 12 0
Expense of cutting, thrashing, and marketing,	1 10 0
Profit,	3 18 9
	£17 11 0
By ploughing wheat per acre, 42 bushels at 6s. 9d.	£14 3 6
To two years' rent, at £2 10s. per acre,	£5 0 0
Six furrows and harrowing, at 10s.	3 0 0
Seed, three bushels, at 6s. 9d.	1 0 2
Sixteen cart loads of manure, at 4s.	3 4 0
Expense of cutting, thrashing, and marketing,	1 10 0
Profit,	0 9 3
	£14 3 6

"I now saw, that though it might be difficult to trench over my fallow-break during the summer months, it was by no means making the most of the system, as the operation was not only more expensive, owing to the land being hard and dry during the summer, but that it was a useless waste of time to take a whole year to perform an operation that could be as well done in a few weeks, provided laborers could be had; and as in all agricultural operations, losing time is losing money, as the rent must be paid whether the land is car-

rying a crop or not, so that in taking one year to fallow the land, and another to grow the crop, two years' rent must be charged against the crop, or at least there must be a rent charged against the rotation of crops for the year the land was fallow. As I felt satisfied that by trenching with the spade, the land would derive all the advantages of a summer fallowing, and avoid all the disadvantages attending it, I determined on trenching 34 acres of my fallow-break immediately on the crop being removed from the ground, and had it sown with wheat by the middle of November, 1832. I may here remark, that I did not apply any manure, as I thought the former crop was injured by being too bulky. As it is now thrashed out and disposed of, the crop per acre stands as follows:

By average of thirty-four bushels per acre, at 7s.	£15 8 0
To rent of land per acre,	£2 10 0
Expense of trenching,	4 0 0
Seed,	1 1 0
Cutting, thrashing, and marketing,	1 10 0
Profit,	9 7 0
	£15 8 0

"The advantages of trenching over summer-fallow, are, in my opinion, very decided, as it is not only cheaper, but, as far as I can yet judge, much more effectual. I am so satisfied of this, not only from the experiments above noticed, but from the apparent condition of the land after it has carried the crop, that I have this autumn cultivated about a hundred acres with the spade, and the crops at present are very promising. When I first commenced, I was laughed at by my neighbors, but now when they see me persevering in what they considered a very chimerical project, they are suspending their judgement, and several of them have made considerable experiments this year. I should think there are at least 250 acres under crop cultivated in this way this season in East Lothian; in 1831, the year I commenced, there was not a single acre. I have therefore the satisfaction of knowing, that I have been the means of causing £1000 to be spent this year amongst the laboring classes in my immediate neighborhood, and I feel confident, that should the season turn out favorable for the wheat crop, and fair prices obtained, their employers will be handsomely remunerated for their outlay. I do not say that this system will succeed in every description of soil, as it must necessarily be of some depth to admit of the operation; but there are few districts where such soil will not be found in sufficient abundance to give ample employment to the surplus population of the neighborhood.

"Now this is going on in a county where agricultural laborers are better employed than almost any other in Great Britain. The system was not introduced, nor is it persevered in, for the purpose of giving employment to the poor, but entirely for the benefit of the employer.

"The East Lothian Agricultural Society are now offering premiums for the most satisfactory reports on the subject. I last year received a medal from the Highland Society of Scotland for introducing the system; and what I value still more, I received a piece of plate from the laborers I employed as a token of their gratitude.

"The system, I admit, is only in its infancy, but I have this year put it completely to the test; and should it succeed as well as it has done hitherto, it must take root and spread over the kingdom; and the landed interest in those districts of England, where the poor laws are so oppressive, and still more, the Irish proprietors, will do well to investigate the system, and have it introduced with the least possible delay, that what is now a burden on their estates may become a source of wealth, and what is now a curse may become a blessing.

"This system if it succeeds to my expectation, possesses all the requisites you require; it furnishes employment for the surplus population by substituting manual labor for that of horses, and certainly if there is a lack of food for both, it is desirable that the one should give place to the other. It will make bread plenty, as the naked summer-fallows of Great Britain will be covered with grain instead of lying waste for a season; it will render corn laws unnecessary, as we will be then independent of foreign supplies; farmers will be enriched who are enterprising and industrious, and they only deserve to be so; it will raise rents, by increasing the capabilities of the soil, enabling the farmer to cultivate wheat to double the present extent; it will raise up a home-market for our manufactures, as the paupers, who are at present starving, or living a burden on the parish, will find employment, and thereby be enabled to procure the necessaries and comforts of life; it will check the poor laws, as there will then be none but the aged and the helpless dependent on parochial aid.

"If you should think it worth while to make further inquiry after the writer or his system, I beg to refer you either to the Marquis of Tweeddale, Lord-Lieutenant of the county of East Lothian, or to Robert Stewart, Esq. M. P. for Haddington district of burghs, both of whom are at present in London; or if you would like a more detailed account of the agricultural part of my scheme, I shall feel most happy to give you every information in my power."

The only remark which this satisfactory letter requires is, that it is hardly fair to charge the trenching with only the real, while the ploughing is charged with an imaginary expense. It is known, and can easily be ascertained by calculation, that the maintenance of a man and a pair of horses does not cost the farmer more than three shillings a day, whereas each furrow and harrowing, which is just a day's work, is charged ten shillings.

From the American Journal of Science.

DESCRIPTION OF THE PHALÆNA DEVASTATOR, THE PARENT OF THE CUT WORM.

This moth, whose larvæ is one of our most destructive enemies, belongs to the Linnæan family noctua, in the genus phalæna. Its specific characters are as follows: Wings incumbent and horizontal, when at rest; body long and thin; thorax thick: but not crested; head small; eyes prominent and black; antennæ setaceous, gradually lessening towards extremities, and slightly ciliated; palpi two, flat, broad in the middle, and very hairy, tongue rolled up between them, not very prominent; clypeus small, legs long, small and hairy; wings long as body; under wings shortest; color a dark silvery gray, with transverse dotted bands of black

on upper wings. The insect lays its eggs in the commencement of autumn, at the roots of trees and near the ground; they are hatched early in May. The habits of the cut-worm have been often and fully detailed. They eat almost all kinds of vegetables, preferring beans, cabbages, and corn. They continue in this state about four weeks; they then cast their skin and enter the pupa state, under ground. This is a crustaceous covering, fitted to the parts of the future insect. In this way they continue for four weeks longer, and come out in the fly, or insect state, about the middle of July. All those chrysalids that I exposed to the sun, died; and all those that were kept cool under earth, produced an insect; hence I infer, that the heat of the sun will kill the chrysalids. If, then, the ground be ploughed about the first of July, many of those insects might be destroyed, and the destruction of the productions of the next year prevented; for the pupa is never more than a few inches under ground.

The phalæna devastator is never seen during the day; it conceals itself in the crevices of buildings, and beneath the bark of trees. About sundown it leaves its hiding place, is constantly on the wing, and very troublesome about the candles in houses. It flies very rapidly, and is not easily taken.

Such is the description of this formidable enemy to vegetation. No efficacious method has yet been taken to prevent its ravages, but the one who could accomplish it, would do the cause of agriculture an essential service.

From the Baltimore Chronicle.

RAILWAY TRAVELLING.

As soon as the rail road from Boston to Providence is finished, the strange prophecy of Oliver Evans, made in 1789 or 90, will be amply fulfilled. Mr. Evans, said that "the man was then living who would see the Ohio and Mississippi covered with steamboats, and the child then born who would travel from Philadelphia to Boston in one day"—meaning 24 hours.

The distance between Philadelphia and New York has been made by the rail road and steamboats in five hours—and it is threatened to be yet made in two hours, as we suppose that it may be, when there shall be a continuous line of rails; but we have yet 19 hours for the distance between New York and Boston. It may be done, even now, in less time.

We learn from the Gazette of last evening, that the extension of the Baltimore and Ohio Rail Road to Harper's Ferry, has been succeeded by an immediate and increasing business both in travelling and transportation of produce and merchandize. Already the travelling averages thirty passengers daily—and an average of five-hundred barrels of flour is receiving every day, besides other articles of produce from the ferry. This trade and travelling will continue to increase regularly—if not rapidly, until the opening of the Winchester and Potomac Rail Road, by which a direct, permanent and speedy intercourse between the extensive and fertile valley of the Shenandoah and the city of Baltimore will be effected. This may be expected to take place in July next. In a month after that opening, the travelling and transportation between Baltimore and Winchester will be as great as it was last summer between this city and Frederick—and within the year, will greatly surpass it.

SMUGGLERS TEACHING POLITICAL ECONOMY.

[The two following extracts, from our last number of the Foreign Quarterly Review, present amusing examples of this truth—that in countries where the despotism of rulers, or ignorance of the people, have served to establish the system of protecting duties, or restrictions on trade, to its utmost and worst extent, the most important relief for the country, and most effectual opposition to the system, will be found in the enterprise and devices of smugglers; who being invited to illegal and vicious acts by the government, then serve to restrain the still more abominable course of the government itself. Some years ago, when the evils of the restrictive system seemed destined to prey on the agricultural and general interests of the United States, without hope of redress from the wisdom or justice of government, we expected, and hoped, that a change would be ultimately produced by the smuggling remedy, which when brought fully into operation, would be far more effectual in this country than in either France or England. We are not afraid of avowing these sentiments, because of the outcry and cant about the demoralizing effects of smuggling. True it is, that violations of law—even of the most iniquitous laws—tend to bring all legal restraints into neglect and contempt—and that the persons who engage in smuggling are always criminal, and often the worst members of society. And it is also true that the skilful physician must sometimes administer a hurtful and dangerous remedy to the patient, when it is the only means of counteracting a more powerful and fatal poison under which he is suffering. In establishing the restrictive system, government is the great poisoner of the morals as well as of the interests of the country, in comparison to whose acts, those of the most desperate smugglers are trivial; and their vicious acts may be at any time stopped, and these free booters rendered harmless, by the government returning to a course of justice and honesty.]

Extract from the Review of French Commercial Policy.

The indirect effect of this precious system is as mischievous as its direct operation. Smuggling is carried on in France in all the prohibited articles to an extent that would be incredible were it not for the unimpeachable authority of the English Commissioners. "An investigation on the Belgian frontier leads us to estimate the amount of British goods (*manufactures*) smuggled into France, from that side alone, at more than *two millions sterling* a year!"—(*Report*, p. 52.) A prodigious mass of colonial produce is also introduced clandestinely across the same frontier. The same frauds are likewise committed along the whole Atlantic and Mediterranean coasts, and across the Spanish and Eastern borders, where, strange as it may appear, English merchandise finds its way for the purpose; and to this must be added the produce of other countries, smuggled in the same manner in very large quantities. These enormous frauds are committed, and go on increasing, in spite of the most vigilant, ingenious, and unsparing preventive service that exists in Europe. Messrs. Villiers and Bowring have collected some highly curious information relating to the risk and cost of French

smuggling. "According to an estimate grounded on the most extensive investigations, the protecting power of the French custom-house is on the whole limited to thirty per cent. on manufactures; so that the average rate of smuggling is probably about twenty-five per cent. on real value."—(*Report*, p. 48.) Fixed insurance lists exist at each frontier and line of coast, and the contraband business is carried on by large and wealthy 'smuggling companies,' with all the order and almost all the security of regular business. The following story has been already repeated on both sides of the water, but it affords such a felicitous proof of the unconquerable ingenuity of fraud, that we shall insert it in our own pages.

"The director of the (French) custom-house says, that since the suppression of smuggling by horses, in 1825, dogs have been employed. In 1823 it was estimated that 100,000 kil. of goods were thus introduced into France; in 1825, 187,315; in 1826, 2,100,000 kil.—all these estimates being reported as rather under the mark: the calculation has been made at two and a half kil. as a *pro rata* per dog. The dogs sometimes carry ten kil., and sometimes even twelve. The above estimate supposes that one dog in ten in certain districts, and in others one in twenty, was killed; but these calculations must necessarily be vague. In the opinion of many of the custom-house officers, not more than one in seventy-five is destroyed, even when notice has been given, and the dogs are expected. Tobacco and colonial produce are generally the objects of this illicit trade; sometimes cotton twist and manufactures. In the neighborhood of Dunkirk, dogs have been taken with a burthen of the value of six, eight, or even twelve hundred francs. The dogs which are trained to these 'dishonest habits' are conducted in packs to the foreign frontier; they are kept without food for many hours; they are then beaten and laden, and at the beginning of the night started on their travels. They reach the abodes of their masters, which are generally selected at two or three leagues from the frontiers, as speedily as they can, where they are sure to be well treated, and provided with a quantity of food. It is said they do much mischief by the destruction of agricultural property, inasmuch as they usually take the most direct course across the country. They are dogs of a large size for the most part. Among the measures proposed for the suppression of this mode of smuggling, a premium of three francs a head has been allowed for every frauding dog (*Chien fraudeur*) destroyed; but this, as appears by the tables, has been wholly insufficient, though the cost has not been inconsiderable, namely, 11,000 francs per annum before 1827, and 15,000 francs per annum since that period, when the premium was allowed in the Thionville district, where the trade is still carried on by the aid of dogs, more extensively than elsewhere. It appears by the return that 40,278 dogs have been destroyed between 1820 and 1830, and premiums to the amount of 120,834 francs paid for their destruction."—*Report of Messrs. Villiers and Bowring*, p. 47.

From Alexander Dumas's Travelling Impressions.

"The most fashionable of the jewellery warehouses in Geneva is beyond doubt that of Mr. Beauté; it is difficult even to dream of a collection

more rich in those thousand wonders that win the female heart; they are sufficient to turn the head of every Parisian lady, and make Cleopatra jump with envy in her tomb.

"These *bijoux* are subjected to a heavy duty on their entrance into France; but for an insurance of five per cent. Mr. Beauté undertakes to smuggle them; the bargain between the buyer and seller is made as publicly as if there were neither custom-houses nor custom-house officers in the world. It is true that Mr. Beauté possesses marvellous address in baffling these harpies; one anecdote out of a thousand will show how justly he is entitled to this compliment.

"When the Count de St. Cricq was director-general of the customs, he heard so much of the ingenuity that baffled the vigilance of his agents, that he resolved to ascertain personally if these reports were true. He went to Geneva, presented himself at Beauté's warehouse, and bought jewellery to the amount of 30,000 francs, on condition that it should be sent duty-free to his residence in Paris. Mr. Beauté accepted the conditions like a man accustomed to such bargains; he merely presented the purchaser with a private bond, stipulating that he should pay five per cent. for insurance. The latter smiled, took the pen, and subscribed *De St. Cricq, director-general of the French customs*, and then handed the paper to Mr. Beauté. The merchant looked at the signature, and making a low bow, simply said 'Monsieur director-general of customs, the articles which you have done me the honor of purchasing, shall be in Paris as soon as yourself.' The Count felt himself thrown on his mettle; he scarce gave himself time to dine, when he ordered post-horses, and was on the road an hour after the bargain was concluded.

"As he passed the frontiers, the Count made himself known to the officers who came to search his baggage; told their chief of the recent transaction, recommended the most active vigilance along the entire line, and promised a reward of thirty *louis d'or* to the officer who should discover the prohibited goods. Not a single officer got a wink of sleep during the next three days.

"In the mean time the Count reaches Paris, alights at his residence, embraces his wife and children, and goes up to his dressing-room to change his travelling attire.

"The first thing he sees on his mantel piece is a beautiful box, of singular workmanship, with whose appearance he was unacquainted. He goes over to examine it, and reads on a silver plate 'to M. the Count de St. Cricq, director-general of French customs;' he opens it—and finds the jewellery he had purchased in Geneva!

"Beauté had a secret understanding with the waiters of the inn, and they, while aiding the Count's servants to pack his baggage, had slipped in the prohibited box. On their arrival in Paris, the Count's *valet de chambre*, seeing the beauty of the casket, and the particularity of its direction, had carried it direct to his master's apartment. The director-general of the customs was the chief smuggler of the kingdom."

STEAMBOATS.

A writer in the *Western Magazine*, states some interesting facts, relating to steam navigation upon

the western waters. He observes that on the 1st of January last, an official list of the boats employed in this navigation which was obtained from an authentic source, gave the whole number at 230, whose aggregate capacity amounted to about 39,000 tons. Of this number, 60 exceeded 200 tons, 70 were between 120 and 200 tons, and 100 were under 120. Of those, whose capacity exceeded 200 tons, 25 were employed between Louisville, New Orleans, and Cincinnati, seven between Nashville and New Orleans, four between Florence and New Orleans, four in the St. Louis trade, and seven in the cotton trade. Before the introduction of the steamboat in 1817, about twenty barges, averaging about 100 tons, afforded the only facilities for the transportation of merchandize from New Orleans to Louisville and Cincinnati, and as they made but one trip within the year, furnished the means of bringing up only 2000 tons. The present tonnage employed in this trade exclusively, may be supposed to give occasion to the conveyance of considerably more than a million tons. From five to eight dollars for one hundred pounds was the old price of the carriage of goods from the seaboard in Pittsburg. Within the last five years, merchandize has been delivered in Cincinnati, from Philadelphia by the way of New Orleans, at one dollar per hundred.

The writer gives also a statement of what he calls the mortality among steamboats, from the autumn of 1831 to that of 1833. During that period, 15 were abandoned as unfit for service; seven were lost by ice; 15 were burnt; 24 were snagged, and five were destroyed by collision with other boats, so that, after deducting those which were abandoned as unseaworthy, fifty-one were lost by accidents peculiar to the trade: equal to an annual loss of 12 per cent. upon the whole number, and of ten per cent. upon the amount of tonnage employed.

It is stated in addition, that there is a vast amount of surplus tonnage, and that the business is entirely overdone: the capital invested in boats has been, as a general rule, a losing investment, and in many cases, a total sacrifice.

IMPORTANCE OF GEOLOGICAL SURVEYS TO VIRGINIA.

[The letter referred to in the following editorial remarks of the *Southern Literary Messenger*, was first published in the *Farmers' Register*, (page 504, Vol. I.) and therefore a knowledge of it has not been necessarily confined to the few readers of our public documents. But this mistake, though requiring the correction here given, does not affect the object, nor impair the main value of the prefatory remarks which we copy below. We are gratified to have the aid of another able advocate for a geological survey of Virginia—an object which we consider all important to a proper knowledge and full development of the value, the resources, and the improvement of our country.]

From the *Southern Literary Messenger*.

The following interesting communication from Peter A. Browne, Esq. of Philadelphia, was submitted last winter, by the Governor of Virginia, to the General Assembly. It was printed with the documents accompanying the annual message, and bound up with the legislative journals, but has had no other publicity. It is therefore

new to nineteen-twentieths, if not to all of our readers. We confess we feel somewhat mortified, that the valuable hints and suggestions thrown out by an intelligent and scientific stranger, should have failed to attract the attention of our public functionaries. We are not without hope, however, that a subject of such vital importance as a geological survey of the state, will claim the earnest and speedy consideration of the people, as well as their representatives. It is one of those subjects upon which all parties, however divided by sectional jealousies or other adverse views, may meet on common ground, and unite in harmonious action. There is no portion of the commonwealth which is not deeply interested in the development of its mineral wealth—none which ought not to lend its hearty sanction to a scientific survey of the country by a skilful geologist. To say nothing of the noble example of other states—among them some of our youngest sisters—our interests are too deeply involved in the proposed undertaking, longer to defer it. Agriculture,—commerce,—the arts,—are alike concerned in the successful prosecution of a work which promises to each such essential benefits. The people of Virginia have been too long ignorant and unmindful of their own vast resources. Who would have dreamed a few years since, that a vein of precious gold, which, for two centuries, had escaped observation, actually enriched our soil? Who now can form an adequate conception of the various hidden treasures which science and enterprise may bring to light? Can the paltry consideration of a few thousand dollars expense, outweigh the magnificent advantages which are likely to result? Shall the present generation fold its arms in supineness, and leave every thing to be done by posterity? We earnestly exhort our legislators to take the subject into serious consideration.

The writer of the subjoined communication will be pleased to learn that the mineral springs of the state, (which might in themselves be made a source of boundless wealth,) have been subjected to careful analysis during the past summer, by an able chemical professor in one of our colleges.* It is understood that the results of his observation will in due time be laid before the public.

THE PROCESS OF INCUBATION OF THE COMMON HEN.

Extract from Professor Low's Elements of Agriculture.

"The first in importance of the gallinaceous fowls is *Phasianus gallus*, the Domestic Cock. To what region we owe this creature is unknown. He is found from the equator to the limits of the temperate regions. In Asia and its islands he is very abundant, and sometimes of large size and great beauty. The large cock of the forests of the East, termed the Jungle Cock, is one of the species or varieties in its wild state, and is supposed by some naturalists to be the origin of the domestic kinds.

"The male of the domestic species, were we not daily familiarized to the sight of him, would appear to be a very graceful bird. His gait is erect, his eyes are sparkling, he is armed with

spurs for his defence, and he is endowed with a courage which often causes him to die rather than yield to an enemy.

"The female is remarkable beyond all other birds for her fecundity; she continues to lay eggs throughout a great part of the year; the period in which she ceases to do so, or does so very sparingly, is that of moulting, which generally lasts from one to three months. After having laid a certain number of eggs, the desire of incubation takes place. This is indicated by strong emotions, and a peculiar cry; and she will sit on any eggs that may be presented to her. Many expedients, some of them very cruel, are practised to check the instinctive passion, so as to cause the animal to lay eggs rather than to hatch.

"It is remarkable that while some of the animals show this desire in the strongest manner, others scarcely manifest it, or, showing it, it quickly leaves them. Hence, while some are engaged in producing eggs, others are ready to serve the office of mother, and on this account there is no kind of the domestic fowls that can be propagated so quickly, and in such numbers.

"The period of hatching is 21 days. The female during this time manifests increasing watchfulness. She will scarcely be induced to forsake her charge, even by the most pressing claims for food, and hence food should be placed within her reach. The number of eggs which one mother is allowed to hatch, is generally from 9 to 15.

"The young is gradually nourished within the shell. It lies without motion; its position is remarkable; its breast is towards one end of the egg, which is formed large for that purpose; its legs are bent forward to the breast; its head is couched beneath one of its wings; and its beak rises from between the wing and the back.

"When the time of its maturity is at length arrived, the desire of life and motion awakes. The little creature employs its beak, thus singularly placed, for the purpose of breaking its covering. It is heard to tap the shell; the emotions of the mother increase as she listens to the attempt of the young to come forth. The beating of the beak is generally continued for two hours, sometimes for six hours, and sometimes for a longer time. At length the shell is broken, and the young is enabled to come forth from its marvellous mansion.

"The anxious mother has no milk to give to her young when they come into day; but Nature has provided for all their wants. The mother teaches the young to find their food almost as soon as born, and their little bills are sufficiently hardened at their birth to pick it from the ground.

"The change of nature in the parent is very remarkable. From the most timid of creatures, she now becomes fierce and courageous; she will attack the largest animal in defence of her young; she watches them with surprising solicitude; she shelters them under her wings, and leads them where food is to be found. After a time her cares cease; she gradually recovers her natural timidity; she finally resumes all her habits, and leaves her long-cherished offspring as if never to know them more."

* Professor William B. Rogers, of William and Mary College.—ED. FARM. REG.

From the Cultivator.

SOILS SUITABLE AND UNSUITABLE FOR WHEAT.

I. H. J. inquires of us, in the *Maine Farmer*, if the culture of wheat has not declined in the old counties of this state, and the cause of this declension. It has declined materially; and there are several reasons for it. One cause is, that we cannot compete in its culture with the great west, on account of the latter growing double the crop, and with less labor and expense in its production, than we do. The west is emphatically a wheat soil, a secondary formation, abounding in lime and animal matters, the specific food of that grain. Ours is but partially a wheat soil, being principally transition formation, and containing less, naturally of the specific food of wheat. Another reason is, that our lands have been injudiciously cropped and impoverished. They have been made to carry wheat too often. A better system of management is obtaining among us, and the quality of our wheat is rather improving with good farmers, though the inducement for raising it is lessened by the facilities of the west for competing with us in this great staple. The vallies of the Hudson and Mohawk, formerly great wheat districts, do not at present, we think, grow wheat enough for the subsistence of their population, throwing out of the calculation the cities of New York and Albany.

I. H. J., who appears to be a practical farmer, may render us a favor, and possibly the community a service, by one or two experiments, no matter upon how small a scale. We have intimated that lime and animal matters are essential to the successful growth of wheat—that they constitute its specific food. These, it is believed, do not naturally abound in primitive formations, particularly in old fields. We wish to have the correctness of our opinions tested, and our request is, that they may be artificially applied, separate and jointly, on different parcels of ground, to be sown with wheat, and that the result may be accurately noted and published. Crushed bones would supply both materials; or, if the lime is applied separately, slaughter-house manure, the urine of animals, soap-boilers' waste, comb-makers' shavings, fish, &c. would either of them supply the other material. It is proper to caution against applying any of these materials in excess—as a small quantity will suffice, and the result will be more satisfactory if the fertilizing materials are applied to the crop which precedes the wheat.

ON FOREIGN AND NATIVE GRAPES.

To the Editor of the Farmers' Register.

Magnolia, near Richmond, Dec. 11, 1834.

I regret that when writing you my short note of the 20th of September last, the hurry of the moment prevented me from expressing myself more at large, respecting the *Norton's Virginia Seedling*, and the *Cunningham's* grape, of the county of Prince Edward. After the experimental culture of the grape for nearly twenty years, (for I commenced it when a boy at school,) I consider that I have at last arrived at the point so much desired, (that is, the discovery of a grape, or grapes, which afford abundant annual crops; and to the culture of which we may lend our labor and care, with the certainty of proper return, for all ex-

penditures. All grapes, introduced into notice, either foreign or indigenous, except the two varieties above named, are subject to rot, mildew, and other casualties, in such a manner, that you can never rely upon any other return than an occasional small yield for the table. At great expense I have collected most of the varieties in a continuous line, from Rome to the upper Rhine, and these have all been discarded as worthless; having left me with an empty purse, as a requital, for many years hard labor. The house (in which I now live) stands upon the site, once occupied by the *Pied Rouge*, *Malvoisie*, *Muscat de Frontignan*, *Mammolo*, *Cariniolo*, *Nigrillo*, *Verdillo*, &c. &c. sent to me from Havre, Leghorn, and the island of Madeira. Foreign vines seem defective in strength of leaf: the scalding suns, and innumerable tribes of insects of this State, and other regions of our country, destroy the foliage, so that during the months of July and August, the fruit perishes from inability to feed on the proper constituents for completing their maturity. Examine, yourself, all of our native vines, and remark the dense, and almost indestructible fibre of the leaves, and you can readily conceive, that nature has so fashioned them with a view to withstand the casualties above mentioned. Look at the foreign vines, with their delicate foliage, and think how illy they are formed to resist the agency of burning suns, and voracious insects. The vine from the banks of the Douro, that variety from which the Port wine is fabricated, I am told throws out a large, tough leaf, and will perhaps, from this circumstance, suit our climate better than those hitherto introduced from abroad.

The Catawba grape, with proper care, produces a wine of fine quality, having the lusciousness of the Malmsey Madeira, combined with a smack of the French Muscat. Wine of this fruit, one year old, has been sold by me this winter, for three dollars per gallon. I regret to say that in some localities it is subject to rot—never, however, to such extent but that you have a tolerable return for your expense in the cultivation.

The Isabella is worthless, in every respect, save one, (the making of tarts) used as you would the young apricots and gooseberries. Whoever attempts the fabrication of wine from this meager berry, will meet with disappointment. For the most part, it does not equal the common twenty cent cask claret of commerce. It is also subject to acquire acidity, bitterness, or a musty taste.

Norton's Virginia Seedling, has never been known to rot or mildew: neither is the wood at all injured by the most severe winter, in any exposure. The bloom for the last ten years, that is, ever since its first bearing, has resisted the ravages of spring frosts. The berries are so closely congregated on some bunches, as to indent one another; yet they all prove equally ripe at the same period of time. So replete are they with the saccharine principle, that if a bunch at full maturity be closely compressed in the hand, it will continue to adhere even after the fingers are expanded; and if a bunch is accidentally suffered to remain on the vine after the first frosts of autumn, the berries become raisins, a circumstance I have never known to take place with any other grape, indigenous or exotic. I have a small cask of wine made from the Seedling last year. It is luscious beyond any thing you can conceive. Some say

it resembles the Burgundy Madeira—others the Lachrima Christi of Mount Vesuvius. A young gentleman not long since from that country, (Italy) says that abroad he should have drank it for the last named wine.

The Cunningham's Prince Edward grape alike resists the winter and spring frosts, and never fails to produce a crop of excellent fruit both for the table, and the press. As yet I have not a sufficient number of vines, to test in a satisfactory manner, the quality of the fruit. What has been made upon a small scale, resembles the wines imported into this place from the house of Murdock and Company; unquestionably the best wine we get from Madeira.

The Worthington grape vine is a great grower, but not abundant as a bearer; the intensely high lake color residing in the skin of this fruit, may be used to advantage in tinting wines. If it ever bears in quantities sufficient for making wine, you may expect it to yield a rich port.

The Scuppernong, or White Bullace, of Roanoke, ripens its fruit with me in October. It possesses a honied sweetness, and musky flavor. I think in a few years it will be more cultivated in Virginia—for the richness of the grape will eventually recommend it to the vigneron for the purpose of enriching the weak must of other fruits.

The editor of the American Farmer received fruit purporting to be Norton's Virginia Seedling, from Pennsylvania, and made the report upon it which was afterwards published in your Register. This gentleman's opinions were so at variance with what I had published to the world, that both myself and friends were at considerable pains to undeceive him, and to convince him that he had taken the wrong pig by the ear. Yet the decree has been recorded, and like the laws of the Medes and Persians cannot be reversed. If I really supposed the circumstance could at all retard the introduction of these two vines into culture (the Seedling and Cunningham) I would be at more pains to combat his opinion. Relying however, upon the truth of my assertions, and the strongest testimony to support them, I do not hesitate again to say, that these two grapes properly cultivated, will, at no distant period, be a nucleus whence will emanate an advantage in our exports, scarcely to be calculated.

DANIEL NORBORNE NORTON.

[While offering thanks for the interesting matter contained in the foregoing communication, we feel bound to say something in defence of the judgement of the former editor of the American Farmer. In the article referred to above, Mr. Smith expressed his opinion, and no doubt both impartially and correctly, of several kinds of grapes sent to him for that purpose from Pennsylvania, where they grew. That among them called the Norton grape, might have been rendered harsh in taste by removal to a northern region—or it might have been altogether a different grape, improperly designated. But under any such circumstances, Mr. Smith could only report the qualities of the new grape as he found them, and with the name by which it was accompanied. However opposed his report was to ours, lately made under somewhat similar circumstances, we have as much confidence in his as in our own, and impute the differ-

ence of opinion to the very different qualities of the grapes examined. So far as may be inferred from what has been published on this subject, we think that Mr. Smith cannot be charged with having done injustice, and that he would be pleased to be convinced, and then be ready to acknowledge, that Norton's Seedling in Virginia has a very different character from the specimen which he examined.]

For the Farmers' Register.

MONTHLY COMMERCIAL REPORT.

The course of trade has been so regular for some time past as scarcely to furnish any subject on which to remark.

Some depression in the price of cotton has occurred this month, in consequence of the opinions expressed by some well informed merchants at the South and West, that the crop of the United States of the present years' growth, would exceed that of the last to a considerable extent. The price declined from 16 cents, its maximum, to 15 cents for prime quality, and would have gone lower, had the decline not been checked by counter statements, that the probable extent of the crop will be about the same as that of 1833—say, rather more than 1,200,000 bales. Time only can solve the correctness of either opinion, and meanwhile speculation will be influenced as one or the other may prevail. The quantity exported from the United States since the 1st of October, exceeds that of last year to the same date. The latest accounts from England (15th November,) may depress prices here.

Tobacco is in brisk demand, and sells at higher prices than usually prevail so early in the season, when the quality of what is brought to market is generally very inferior, consisting of the worst portion of the crop, only partially cured and unfit for exportation. The current sales are from \$4 to \$7½ per 100 lbs. The foreign export of the old crop has latterly been chiefly to France, to which market, until the present month, only one cargo had been shipped this season. The stock remaining on hand at the Virginia inspections on the 1st inst. was but 5,500 hhds. against 15,000 on the 1st December, 1833, and this small stock will be considerably reduced by shipments during the present month. Markets abroad are not very favorable for this article—nor does the consumption of it increase.

Flour continues to decline in price under the pressure of heavy supplies from the West, and the absence of foreign demand. In New York, \$4 62 to \$5 25 embraces all quotations, except for Richmond City Mills, which is worth \$6. The crop of wheat in Virginia is nearly exhausted.

Indian corn commands \$3 to \$3 25 per bbl. of 5 bushels, and higher prices in the interior, where the crops were injured.

Pork sells readily at \$5½ to \$6 per 100 lbs.

There is no change in the value of stocks, exchange, &c. to require particular notice.

x.

December 20th, 1834.

TO CORRESPONDENTS.

Communications have been received on the following subjects: *New mode of keeping sweet potatoes—Preservation of posts, &c. &c.—Observations on wild rice—Queries respecting cedar hedges.*

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EDMUND RUFFIN, EDITOR AND PROPRIETOR.

ON THE USUAL COURSE OF PROCEDURE OF AGRICULTURAL SOCIETIES.

To the Editor of the Farmers' Register.

Dec. 1, 1834.

The rapid increase of our agricultural societies, since the establishment of the "Farmers' Register," to which I confidently ascribe it, has been a source of much gratification to one who has been, so long as I have, a firm believer in their great utility. But many things are wanting in their usual management to render them as beneficial as they might be, to the general interests of husbandry. The cause of this deficiency it is needless to investigate; but it is highly important, if I am right as to the fact, that the errors should be pointed out, and some remedy suggested. This I propose to do, if an old campaigner in such matters may hope to be acquitted by his agricultural brethren, of presumption in taking upon himself this monitorial office.

In the first place, there is too little punctuality on the part of their members, in attending their periodical meetings. There are two great disadvantages in this—one is, the total loss of their personal co-operation; the other—the usual non-payment by such absentees, of their annual subscriptions, which is almost sure to produce displeasure, if not withdrawal, when these arrearages are demanded; especially if they have been suffered to accumulate for two, or three, or four years.

In the next place there is far too great a backwardness on the part of those who do attend these meetings, in communicating individually, either verbally, or in writing, the results of each member's own agricultural experience for the past year, or six months, according as their meetings may be annual or semi-annual. A false modesty, or still less excusable indolence, is the cause of this, and the consequence to the society is, that each attending member returns home very little wiser than he was in regard to the chief objects for which such societies are established. The most important of these surely is, to enable each member to add something to his own professional knowledge, by free and frank communications interchangeably made by all. Until this can be regularly and constantly done at the regular meetings of every society, they will prove but little more than mere convivial assemblages of friends and acquaintances, who like to see each other face to face, and to shake hands at least once or twice a year.

The remedy which I would respectfully suggest for the first evil is, the punctual attendance of the members at all the meetings of their respective societies—an attendance which nothing should be suffered to prevent, but some urgent necessity—and the no less punctual payment of every annual subscription.

To prevent the second evil, I would most earnestly recommend that every attending member should hold himself bound to make some statement, either verbal or written, no matter how concise, provided it be sufficiently particular, of the

management and condition of his own farm, (if he has one,) for the preceding six or twelve months. These, when written, might be in a tabular form, such as I myself know, (for I have seen them) were constantly made by Gen. Washington's manager, at Mount Vernon, and which were as minute and particular, as any that he ever required from the heads of the different departments in his army. Reports made on similar principles, and with equal care, to our agricultural societies, by their respective members, would form a body of agricultural statistics, highly valuable to each, at the same time that they would diffuse more rapidly than by any other means, over the entire country within the limits of every society, the whole stock of knowledge possessed by its members, in all the different branches of husbandry. Then, indeed, but not until then, would these societies soon prove how much good they are capable of effecting, and how rapidly by their agency, the now melancholy aspect of most of our arable lands might be changed to an appearance of exuberance and joyous plenty. One of the happiest effects of this conviction, would be to check, at least, if not entirely to banish from good old Virginia, that desolating spirit of emigration which has long been, and still is tearing asunder among us, the ties—not only of neighborhood, long acquaintance, and friendship, but of blood—of family union—of fathers—mothers, and children—of brothers and sisters—and in some instances, even of husbands and wives. When once these bonds of natural affinity are ruptured, a cold-blooded selfishness—an insatiate money-getting spirit—is apt to get possession of us, to the exclusion of almost all our better feelings and affections. We soon lose all attachment to the homes of our fathers—we never again feel *settled*; and are ready at a few hours notice, to flee with the speed of wandering Arabs, to the extremities of the earth, in search of other new lands, provided only, we have persuaded ourselves, that they will yield us more money! more money!

Another evil which greatly lessens the utility of our agricultural societies, at least where their funds enable them to have shows and fairs, is the principles upon which they award their premiums. Although these principles have again and again been demonstrated to be both false and highly pernicious, especially by that excellent farmer Timothy Pickering, so long president of the most celebrated of all the northern and eastern agricultural societies, yet they still continue to regulate the distribution of premiums in every society with which I am acquainted. Let it suffice to exemplify my accusation by stating the cases of fattened animals, whether exhibited on the hoof, or slaughtered. Here the premium is invariably awarded to the one which is judged to be the *fat-test*, without the slightest inquiry whatever, as to the expense of feeding—even where a statement upon honor of the process is required in their handbills. The consequence always is, that the competitor who is most profuse in feeding—who is most anxious to obtain the premium without re-

gard to the cost of his prize, will gain it from his rivals. But the object of all these premiums should really be, to ascertain and establish the most economical way of fattening stock of every kind; and consequently, a particular and trustworthy statement of the mode of fattening, should never be dispensed with in any case whatever. By no other means can the poor farmers be enabled to compete with the rich, although to encourage this competition, without a risk of loss to either, ought surely to be one cardinal purpose of every agricultural society; and this can be done only by making economy, and not profusion in the process of fattening, the chief test of superiority.

In reviewing the previous remarks, I find that I have omitted what seems to me the strongest argument in favor of annually requiring, as a matter of duty, verbal or written statements from all the members of our agricultural societies, who are cultivators of the soil. The consciousness of this obligation would be a powerful incentive to increased effort in all their agricultural operations, while its fulfilment would teach them *method*—a thing in which most southern agriculturists are deplorably deficient; for not a few may be found who keep no farming accounts whatever—who have no knowledge of what their net profits, (if any,) may be; nor can tell any thing scarcely, about their farms, but the gross amount of sales. The apprehension too, of each reporting member, lest his own statement might fall below the average standard, would certainly excite a more constant and judicious attention to every part of his professional business, than if no such public expose was required to prove how far he had fulfilled all the duties of a good farmer. It is true that such a requirement would tend strongly to produce exaggerated reports, but men *must trust* each other to some extent, in almost all situations; and in this case we ought to hope, that the sentiments of truth and honor would so far check "the long-gun shooters" to be found in all large associations of men, as to secure unvarnished statements from a great majority of the members of every agricultural society, who could be prevailed upon to report at all. The performance of this duty would not, of course, be expected from any but the cultivators of the soil. These, however, should feel themselves bound to perform it, and then each would become more and more attached to his particular society, from a consciousness that he was every year contributing something more than his mere subscription money, towards the beneficent objects of its establishment. All members need not be farmers, planters, or graziers; but all should be, at least, thoroughly convinced of the great utility of agricultural societies, and constantly desirous to co-operate actively in promoting their purposes. Then would the salutary efficiency of these associations soon be rendered so perfectly manifest to all, that there would scarcely be a county in the state without them. There is but one class of persons among those who are apt to become members, that I think ought to be carefully excluded, if there was any mark by which they could be previously known. I mean the dragoons of that flying squadron of pretended agriculturists, who dash in, wherever they expect some paltry pecuniary gain, by carrying off premiums, and then, as suddenly, dash out, when the prospect of such petty plunder no longer pre-

sents itself. These harpies care no more for the interests of agriculture than they do for those of the Grand Turk, and generally know quite a little about them. But they will always be found hovering over, and ready to pounce upon the funds, however slender, of every agricultural society, where there are shows and fairs. Their motives, however, usually carry their own punishment along with them; for like gamblers in a lottery or at faro, they almost always leave more money than they carry away. Although each is ready to say, "farewell, ye agricultural gulls," as soon as he clutches the miserable pittance for which he came, this is generally more than reimbursed by the greedy contributions of his unsuccessful competitors of the same squadron or troop. Verily they get their deserts in the loss of some two or three dollars, and the gain of angry and grievous disappointment in failing to make some six, seven, or eight hundred per cent. upon their petty outlay of some two or three hundred cents! Add to this, they are always sure of a rich recompense of reward in the scorn and contempt of all who understand their motives.

J. M. G.

P. S. To make myself better understood in regard to the annual reports recommended to be made by all the members of our agricultural societies, who are cultivators of the soil, I will take the liberty of suggesting the following heads for each, in a form sufficiently abbreviated, yet minute, to answer the purpose.

Let each report state the number and kind of laborers on the farm—the number of fields, of cultivated acres in each, and rotation of crops: the number of plough team, and whether horses, mules, or oxen: how fed and sheltered, and whether kept up constantly, or occasionally grazed: average number of acres to the plough: average produce per acre in bushels of corn, wheat, oats, rye, and root crops: pounds of cotton and tobacco per acre: preparatory ploughing for corn and other crops, how and when performed: corn, with what implements, and how cultivated and harvested: what use is made of the offal: small grain, how seeded and harvested: number of different kinds of stock, other than plough team, with their annual increase or decrease—how fed and sheltered: how much land manured by each kind, or all together, and from other sources, if any: time and distance of hauling out manure: what increase of product by its application, and how applied—by ploughing in, or surface dressing: fallowing, if any, how and when executed: what artificial grasses are cultivated, and how fed away: how many of each kind of stock are fattened for market, or family use, and what has been the process of fattening.

The minute particularity of the foregoing statement, I dare say, will cause many to exclaim, "oh! too troublesome entirely: I can't go it;" while some of "the goodenoughs," in all the ineffable pride of their self-sufficiency, will even make a jest of it. But since it must be perfectly obvious, on the slightest reflection, that all these circumstances are regarded as matters of importance, on every well regulated farm, they are certainly worthy the attention of all agriculturists desirous of improving in their profession. To such as care little or nothing about it, or believe themselves

omniscient in husbandry, the remarks are not addressed at all. But we will venture to affirm, of all others who could prevail upon themselves to attend to them so far as to undertake the making of some such report once a year, that they would not only greatly increase their own knowledge thereby, but would render their farms and every thing on them, both more profitable and interesting. Their fondness for their profession and customary employments, would augment in proportion to the additional advantages and enjoyments which such attention to it would procure; and they would soon make a *pleasure of their business*, instead of a *business of their pleasure*, as too many of our land-owners in Virginia have been doing from the earliest settlement of our state. This dereliction of agricultural duties—which seems to have been hereditary in numerous families—co-operating with an indiscriminate, most wasteful, and foolish pride of hospitality, has done more to prostrate the husbandry of our beloved state, or rather prevent its attaining any high improvement, than all other causes put together. Not that I am an enemy to hospitality properly so called—that I mean, which springs from the heart, and increases *pari passu* with the means of indulging it: no, God forbid. But the kind which is to end in the ruin of those who display it, is not only spurious, but as much to be dreaded and deprecated as the cholera, or any other destructive disease. It begins in vanity, or idleness, or inordinate love of what is falsely called pleasure; and ends in poverty, long-suffering, and ruin; or in the heart-rending abandonment, by emigration, of home, friends, kindred, and the dearly cherished land of our nativity.

[The foregoing communication treats on a subject of much importance, and which greatly needs such comments and strictures, if indeed *any* can have effect. Perhaps every reader, like ourselves, may object to some parts of the details recommended by J. M. G.; but there can be none, who have considered this subject, who will not admit the value and importance of the writer's general remarks, as well as their correct application. We have frequently, but fruitlessly, attempted to call the attention of the members of new agricultural societies, and of those intending to form societies, to the general and similar defects of such associations. Judging from such results as are before the public, our suggestions have been useless; and by their being repeatedly brought forward, possibly may have given offence. As a last effort, we request that every member, or intended member of an agricultural society, who may read the foregoing communication, will also read two pieces which, with similar views, were inserted in the early part of our first volume—"A report on agricultural premiums," at p. 147, and a communication on the "Advantages and defects of agricultural societies," p. 201, v. I. Far. Reg. However, we should be altogether unworthy of conducting a journal devoted to the "support of the interests of agriculture" if we feared to give offence by uttering unpalatable truths in the performance of our duty.

ADDRESS TO THE NORFOLK AGRICULTURAL SOCIETY.

By WILLIAM GARNETT, Esq., President.

Ordered to be published in the *Farmers' Register* by a resolution of the Society.

Gentlemen—I now avail myself of the first opportunity that has offered, since our organization, to return you my thanks for the honor you have done me, in calling me to preside over the *Norfolk Agricultural Society*. I must, however, be permitted, at the same time, to express my regret that your choice did not fall upon one better qualified to serve you in that capacity. And this disclaimer, I can assure you, is not made merely in compliance with a customary form, but under a thorough conviction, that I can lay no claim to the knowledge, either theoretical or practical, which it is desirable that the presiding officer of such a society should possess. If, therefore, I should be so fortunate as to contribute, in any degree, to the advancement of the objects which we contemplate, I shall be indebted, almost entirely, for such contribution to researches into the recorded experience of others.

In this way, I may perhaps, occasionally, be able to bring to your notice facts which might, otherwise, not be so generally diffused. And, in this way, every member of the society may contribute his quota towards the dissemination of the agricultural information which past experience has accumulated. But we should not rest satisfied here—every day new additions are making to the acquired stock of agricultural knowledge, and it should be our aim, both individually and collectively, to add our mite to the general contribution. To pursue the study of agriculture rightly, we should, as in the case of other sciences, adopt the inductive method, and rest our principles upon the solid foundation of well attested facts, the result of attentive and intelligent observation. And it is the province of societies like ours, to collect, record, and to excite, as much as possible, public attention to the proper improvement of the information thus obtained. To this end, it is hoped, that every member of this association, which we have voluntarily entered into for this purpose, will zealously co-operate. None of us, we trust, will be content to be mere sleeping partners in the concern, but let us rather anticipate that all will be impelled, both by duty and inclination, to take an active part in promoting the objects for which we have associated. Then may we hope to realize benefit to ourselves, and to impart the advantages which we may derive, to others.

But permit me, again and again, to repeat, that we can never calculate upon so desirable a result, unless we pursue the objects we have in view from the establishment of our society, with spirit and activity, and can succeed in exciting in our members generally, an interest in the concerns and operations of this institution, which will induce them to engage actively in the advancement of its welfare. One of the most obvious modes by which this can be accomplished, is by a free communication of all important facts relating to the subject of our science, which may come to the knowledge of any of our members. Much very important and highly useful information, it is to be feared, is withheld from the agricultural community, from an unwillingness that many persons have

to appear before the public as authors, arising from a diffidence of their powers in the art of composition. This might be a good reason for such reserve, if the object of the writer was to make a display of his skill in the art of writing; but where nothing is contemplated but the communication of useful facts, the graces of composition may well be dispensed with. We shall never value the information that may be thus imparted to us, a whit the less for any deficiency in the polish of the style in which it may be conveyed; but will ever prize one useful and well attested fact bearing upon the subjects to which the attention of our society is directed, to the finest theory, which the most brilliant imagination can suggest. All that is requisite in the communications, which we solicit, is a plain statement of the facts communicated, with such of the accompanying circumstances as may be necessary to enable us to draw correct inferences from them. Many of our members, we have no doubt, could aid us essentially by furnishing us with the result of their agricultural experience; and I trust that none, who have the ability, will, like the unprofitable servant spoken of in the scripture parable, prefer to bury their talent, rather than put it into useful circulation.

As may have been anticipated from what was said in the commencement, I have but little worth communicating from the very slender stock of my own agricultural experience; nor have I as yet had the leisure to draw from the sources of information alluded to in the beginning. But there is one important fact in relation to the application of manure upon which I can speak experimentally, and to which I will therefore call your attention, as I deem it much more deserving of consideration than it is generally thought. Some years ago, in reading the proceedings of an agricultural society, somewhere in the state of New York, I observed that the owner of a farm, who obtained a premium offered for the best managed farm in that part of the country, stated amongst other matters in relation to his management, that for many years, he had applied all his manure to the surface of his land after planting his crops, instead of previously ploughing it into the land, as had hitherto been his practice. Since then, I have applied the greater part of the manure I have collected in the same manner, and have invariably found the crops better than they were upon the land where the manure had been used according to the old method. This difference is much more manifest, where coarse litter is used, than in the case of well rotted manure; and of a very dry season, I think I have witnessed a difference of at least one hundred per cent. in favor of the surface dressing, though I have never tested the matter by actual measurement. But during severe droughts I have seen the corn fired nearly to the shoot, upon land into which coarse litter had been ploughed previous to planting, when the corn, which had the manure spread over the surface after planting, was perfectly green and flourishing. In further corroboration of the opinion herein advanced, of the superior advantage of an application of manure to the surface, over the practice of burying it in the land, I will mention one other fact. Soon after the appearance of some essays signed "*Arator*," and written by Col. John Taylor, a celebrated agriculturist, it was the practice of many farmers in the part of the country in which I then resided, to

plough up the land, upon which they had penned their cattle during the summer, as soon as the cow pens were removed, to avoid the loss, which he had taught them to apprehend from the evaporation of the manure if left exposed upon the surface of the land to the action of the sun and moisture. Whether from accident, or design, it so happened, that some of the cow pens remained unbroken until the following year, when they were ploughed up to plant in corn; and much to the astonishment of those who had implicitly believed in the supposed loss from evaporation, it was found that this land produced much better than that which had been ploughed as soon as the cattle had been taken off. The consequence has followed, that the practice of breaking up cow pens, upon their removal, has been abandoned in the part of the country alluded to, I believe, without a single exception. From my own experience, therefore, on this subject, as well as upon the testimony of several experienced farmers, whose experiments have led them to the same conclusion, I do not entertain the least doubt as to the superiority of the method of applying manure herein recommended, over the mode formerly used.

With regard to the implements of husbandry, I am not sufficiently acquainted with the state of agriculture in our region to know how far the modern improvements in this particular have been adopted with us. But I have been informed and believe, that very little attention has been paid, in this section of country, to this important branch of rural economy. Being however, almost entirely unacquainted with the extent of our deficiencies in this respect, I will postpone this subject for another communication, by which time I hope to be better acquainted with our wants and the sources from which they can be supplied. But before I take my leave of it, I will briefly describe to you an implement much used in the part of the country in which I formerly resided, in the preparation of newly cleared land for cultivation. It is called the new ground coulter, and differs from those formerly used in that part of the country, in having a blunt edge in place of a sharp one. The advantage gained by this change, is, that the roots are broken, and torn out of the earth, instead of being cut and left in the land; nor is it ever impeded in its progress, by sticking in the roots, as is frequently the case where the sharp edged coulter is used. Oxen are generally employed as better adapted to such work, where frequent stoppages occur, than horses; and a hatchet is carried on the brake of the plough, to chop such roots as are too stubborn to be broken. The new ground coulter is also much used to open furrows for planting corn; and for this purpose two short mould-boards are fixed upon the upper part of the helve, while the coulter going several inches below the bottom of the furrow, opened by the mould-boards, prepares the land underneath, for the reception of the small roots of the corn as soon as it vegetates. Some farmers likewise use this plough for siding corn, in stiff land, preparatory to weeding; but, in this case it is used without any mould-board. In short, I do not know a cheaper or more useful agricultural implement than the new ground coulter, or one by which so great an amount of labor can be saved, at so little cost. I have seen large new grounds completely prepared for the use of the ordinary plough by running this coulter previously through the

land; and the work of 15 or 20 hands, which would have been otherwise employed for several weeks in grubbing and hilling the ground, entirely saved. Mr. Richard Baylor, an officer of our society, has one of them, which I ordered for him, and I have had another made at the request of Mr. A. Foreman, also one of our officers, which will furnish an opportunity to such as think the matter worth inquiry, to examine the plough for themselves. The construction is so simple, that the most ordinary blacksmith can make them by these models. In conclusion, I would remark, that few things are of more importance to the farmer than a judicious selection of the implements of husbandry, both as it regards the economy of labor, and the due preparation of the soil for cultivation. And if I have not been greatly misinformed, much is required in this department to place us upon the vantage ground occupied by our more enterprising and industrious brethren of the north, or even of many parts of our own state. I therefore recommend this subject to your particular attention. Much may be done to better our condition in this respect before we meet again, if we can but infuse new energy into our operations, and excite something like interest in agricultural pursuits in this and the neighboring counties. But candor compels me to add, that if we continue to manifest the same indifference to the well being and progress of our society, which has, so far, characterized our first efforts, we may, at once, abandon all hope of advantage to ourselves, or utility to the public, through the agency of this institution, which without more spirited exertions than have yet been made, we may consider as virtually dissolved.

From the Richmond Enquirer.

PRESENT STATE AND PROSPECT OF THE RICHMOND, FREDERICKSBURG, AND POTOMAC RAIL ROAD.

Richmond, Fredericksburg, and Potomac Rail Road.—The three-fifths of the stock, with the exception of about \$70,000 has been subscribed by private capitalists of undoubted responsibility—about \$150,000 by gentlemen in Philadelphia—and 5 per cent. actually paid in. The 70,000 dollars will be readily made up, and is pledged to be subscribed, before the state will be called on to subscribe its two-fifths. A bill is now before the House of Delegates to subscribe the two-fifths or \$280,000. We entertain no sort of doubt of the value of the investment—nor of the great utility of the proposed rail road to the public at large. We have requested some information on the subject from Mr. Moncure Robinson, the engineer, who has been so obliging as to address us the following letter.

Richmond, Dec. 28th, 1834.

Dear Sir.—I hand you, agreeably to your request, the following information in relation to the Richmond, Fredericksburg, and Potomac Rail Road.

Twenty-seven miles of the road, extending from Richmond to the North Anna, were contracted for on the 27th, (yesterday,) at an average expense of \$8,000 per mile. The work was let to contractors of the highest responsibility; and the grading and masonry of this portion of the road, are to be

completed by the 1st of July. The rails, it is presumed, may be laid in the course of the summer and fall, so as to admit of the use of this portion of the rail road by the 1st of December next.

It is the intention of the company, if the usual subscription of two-fifths should be made by the state, to place the remainder of the road to Fredericksburg under contract in the month of May or June, so as to insure the completion of the whole road in the course of 1836.

The distance from Richmond to Fredericksburg will be reduced by the rail road from sixty-seven miles to fifty-eight; the time of travelling it, from fourteen hours to three hours; and the journey between Richmond and Washington, from twenty-four hours to between eight and nine.

The cost of the trip between Richmond and Washington, now between ten and eleven dollars, will be reduced to \$6 50 per passenger.

With the facilities afforded to the travel, by the proposed work—in connection with the great line of steam boat and rail road communication between Washington and Boston, now on the eve of completion—the friends of the improvement are sanguine that so large a portion of the travel now taken by packets between New York and Charleston, may be diverted from the coast to the interior, as to afford, immediately on its completion, to stockholders, a dividend of six per cent., from this source alone. Independently, however, of the travel, a great trade may be expected on the rail road. The line passes within about 3 miles of the Deep-Run coal field. By a branch to it, coal will be transported from these mines both to Richmond and Fredericksburg; and cotton, now brought by the Petersburg Rail Road, to Petersburg and Richmond, may be expected to be conveyed to Fredericksburg; and the water-power of the last named town made use of, as at Richmond and Petersburg, for its manufacture. In agricultural products, the trade of the rail road will be any thing but inconsiderable. It is true, that the country through which it passes is not generally fertile; but the cheapness of transportation will bring lands into market not now cultivated, and increase largely the amount of its products; and improvements of the North and South Anna Rivers, already projected, or branch rail roads, will extend the benefits of the improvement to the counties of Louisa, Spotsylvania, Orange, and Madison. Whilst the prosperity of our sister town, Fredericksburg, will in many respects be promoted, and cannot be impaired by it, Richmond may be expected, by the execution of the work, to be placed in the relation to her which Baltimore now occupies; and produce, which would otherwise leave the state to find a purchaser, be brought to this place. But a more probable result will be, the improvement of the markets in both towns, in consequence of the facility of intercommunication afforded by the rail road, which will enable the merchants of either town to make purchases advantageously in both.

I will add only in addition to the above, that the definite location of the work, as far as it has progressed, shows that it will be executed at much less than it was at first computed at. The original estimate, based on the experimental line first traced, was \$763,000 for the whole work, including the necessary depots, locomotive engines, cars and carriages. Great improvements have

been made in the line, and it is now ascertained that it will not probably exceed \$680,000, or at farthest \$700,000, inclusive of the above items.

I remain, dear sir, yours, very respectfully, and truly,

MONCURE ROBINSON.

T. Ritchie, Esq.

The following extracts from the address of the commissioners, published in this city in May last, will throw additional light upon the value of the proposed improvement:

EXTRACTS FROM THE ADDRESS, &c.

Address of the Commissioners, to the Citizens of Richmond and Fredericksburg, and the inhabitants of Henrico, Hanover, Caroline, and Spottsylvania.

By the report of the engineer, communicated to a committee of citizens of Richmond, on the 4th of January last, it appeared that the distance between Richmond and Fredericksburg, by the experimental line surveyed prior to that time, was sixty and a half miles, and that the whole cost of the work, including depots, warehouses, and water stations, locomotive engines, cars, and carriages, was estimated at seven hundred and sixty-three thousand dollars. The further surveys which have been since made by the engineer, show that a reduction in distance of one and a half miles may be effected between Richmond and the Pamunkey, by a line terminating in H street, on Shockoe Hill, and the cost of which will be about \$40,000 less than that of the line first traced.

The commissioners understand from the engineer that no doubt is entertained by him, that farther reductions in the length and cost of the road, will result on its definite location, so that the whole cost of the road, with all its appendages to Fredericksburg, will not probably exceed \$700,000, if indeed it should reach this sum; and that the whole length of the road may probably be reduced to fifty-eight miles.

Presuming these views to be correct, (and that they are so, the commissioners have as a guarantee the professional reputation of the gentleman to whom their surveys were committed,) there can be but little doubt of the productiveness of the improvement, and that as an investment, none which has been offered for many years to the public can be more advantageous.

In confirmation of the above positions, they would respectfully submit,

1st. That every rail road hitherto made in our country for the accommodation of travel has been productive.

2d. That the line of rail road in question, would necessarily take, not only the whole travel between the city of Richmond and town of Fredericksburg and the north, and that between the city of Washington and towns of Alexandria, Georgetown, and Fredericksburg, and the whole south, and all the local travel on this line, but also the largest portion of the large travel between the north and south, now accommodated by the packets on the coast and the bay steamboats.

That the above view is correct, it is only necessary to advert to the fact that the Baltimore and Ohio Rail Road Company are now executing with great energy the branch of their rail road, which

is to connect the cities of Washington and Baltimore; and that this work will have been completed in the course of two years from the present time. By means of it and the contemplated improvement between Richmond and Fredericksburg, a travel may be expected to be diverted from the bay and the coast through our towns, and an increase of that on the line of the improvement, the extent of which can only be appreciated by those who have witnessed the vastly increased intercourse produced by similar improvements in other quarters of our country.

In the absence of specific data on the subject, the experience of the Petersburg Rail Road Company furnishes some facts which are pertinent. Previous to the execution of that work the average number of passengers in the line of stages between Petersburg and the Roanoke did not, it is understood, exceed three each way per day, or varied between 30 and 40 per week. Since the execution of that work, the number has averaged generally between 30 and 40 per diem, or from 300 to 350 per week; the increase of the travel on the route occasioned by the execution of the rail road having been nearly in the ratio of ten to one.

Presuming only half the increase between Richmond and Washington that has taken place on the Petersburg Rail Road, or an increase in the ratio of five to one, (and when we recollect the great facilities which will be produced by the contemplated improvement, the estimate seems to be at least a very moderate one,) we should have about 420 passengers per week on the contemplated rail road; or estimating the fare of each passenger at \$4, sixteen hundred and eighty dollars per week, on the proposed improvement, from passengers alone.

With every confidence in the above views, the commissioners respectfully present the following as a probable estimate of the annual receipts on the proposed line of rail road:

For passengers, 429 per week, or 21,840 per annum, at \$4,	87,360
For the transportation of the mail,	10,000
On cotton, coal, agricultural products and merchandize,	25,000
	
	122,360

Deduct for repairs of road, wear and tear of locomotive engines, cars and carriages, and expenses of transportation, 50 per cent.,	61,180
	\$61,180

And we have a nett balance of \$61,180, or nearly nine per cent., to divide to stockholders immediately on the execution of the proposed improvement.

But there can be no doubt that the above income must largely increase with the growth of our country and its increasing trade and travel. With the facilities offered by the proposed communication for the transportation of coal and cotton to Fredericksburg, there can be little doubt that the last named town will become like Richmond and Petersburg, rapidly manufacturing; and its excellent water power, so readily available, but now so little used, be employed to give a new stimulus to the industry of the country in which it is situated. The effect of an increased prosperity

will be, to extend in a still greater ratio, not only the intercourse between our towns, but that between them and the northern cities; whilst the travel of that class of persons who visit the cities of Washington and Richmond, during the sessions of congress and the legislature, from motives of business or pleasure, may be expected largely and steadily to increase.

The commissioners, looking at the subject in these aspects, can scarcely doubt that in the course of a reasonable period the improvement will produce to the stockholders, in dividends, the maximum (15 per cent.) authorized by the charter; and this maximum, if produced by the tolls, it will be recollected, is completely secured to the company for a term of thirty years after the completion of the rail road, by a clause in the charter, which guarantees the company during that period against all competitions from any rival work.

The above views go to show that an investment in the proposed improvement cannot fail to be *secure and productive*; but other considerations still more decidedly recommend its patronage to the citizens of Richmond and Fredericksburg and the intervening country. To the owners of property between Richmond and Fredericksburg it will insure a cheap and speedy transportation of their products, and of course, a large enhancement in the value of their lands. To the merchants and shippers of both towns, a facility in keeping their assortments complete and in making their purchases and transacting business in either town—to the hotels and boarding houses in both towns, an increased business, proportionate to the largely increased amount of travel. But by the property holders in both towns, the benefits of the improvement will be more particularly felt. Its enhancement may be greater in some than in other portions of each town, but will be felt in some degree in all. H street in Richmond, now so partially built, may be expected to become in a few years, throughout its whole extent, what Broad street in Philadelphia, since it has been occupied by the Philadelphia and Columbia Rail Road, has been becoming so rapidly, a handsome avenue, presenting on either side ranges of warehouses and retail stores, handsome hotels and boarding houses; and the industry of our city and Fredericksburg will experience a new impulse from the foundries and work-shops to which the rail road will give rise. Fredericksburg, in addition, on account of the abundance and cheapness with which all the supplies of life are procured there, may be expected, when an easy communication is procured to and from it, to become the residence of many families of that class in society who are not tied down by the engagements of their members to any particular spot, but left free to select the abode which presents most attractions. But it would be difficult to point out the many results which may be expected to ensue from the execution of the work in question, to the towns which it will connect. Unless the commissioners are greatly mistaken, the productiveness of the improvement as a stock, clear as it seems to them, is its least recommendation.

In conclusion, the commissioners would remark, that the whole amount of private subscriptions requisite to the completion of the work is \$420,000 or three-fifths of the capital stock of the company, as there can be no doubt that the state will next

winter subscribe the remaining two-fifths; and that to organize the company a subscription of \$300,000 is by the charter made sufficient. Two dollars per share is to be paid at the time of subscribing, which sum, of course, will be repaid to each subscriber, if the amount necessary to organize the company should not be made up.

JOHN H. EUSTACE,
FLEMING JAMES,
LEWIS WEBB,
JOHN A. LANCASTER,
JAMES BOSHER,
RICHARD C. WORTHAM,
CONWAY ROBINSON,
WILSON ALLEN,
FAYETTE JOHNSON,
W. S. BLACKFORD,
JOHN L. MARYE,
JOHN DICKINSON,
JOSEPH M. SHEPPARD.

From the New England Farmer.

EXTRACT FROM A DISSERTATION ON MAKING AND APPLYING MANURE, BY JAMES HALE, ESQ.

For which a premium was awarded by the Merrimac Agricultural Society.

It has been observed by a writer on agriculture, that manure stands in the same relation to the farmer, that a stock of goods, calculated to meet the market, does to a merchant. Whether the comparison is correct or not in every point of view, it cannot be denied that manure is an article of the greatest importance to the farmer. It is the intention of the writer to present to the public, in a plain and concise manner, for the aid of the practical farmer, as well as to excite an investigation, a few ideas on the subject of making and applying manure.

MAKING MANURE.

This subject comprehends not only the best manner of saving and preserving the manure, which is naturally made by a stock of cattle on a farm, but likewise the best method of increasing that quantity by the aid of other materials. The manure made in stables during the winter season should be cleanly thrown from the same every day, and the stable floor well littered with straw or refuse hay. The litter, besides increasing the quantity of manure, conduces to the ease and health of the cattle, and increases both the quantity and quality of the milk of cows. The cattle in the winter should usually be confined in the farm yard, and the cows at least should be yarded during the night in the summer season. It is said by practical farmers that three loads of manure, kept under a cover through the spring and summer, are worth four exposed to the air during that time.

The manure made by fattening hogs should be frequently cleaned from the hog house and placed in the yard adjoining—(no farmer should be without a hog yard—) and the sty should be frequently replenished with plenty of straw or other litter.

But the thriving, economical and scientific farmer will not depend solely on the preceding methods for his stock of manure; but, for the purpose

of increasing the quantity of the same, will frequently make calculations resembling some or all of those which follow; and not only make, but actually put them in practice; for, give me leave to observe, that calculations alone will make very little manure.

*The farm yard.** As soon as the haying and harvesting season is over, the farmer should commence collecting a large quantity of brakes, swamp grass, or coarse refuse grass of any description, and, after having removed the manure from his barn yard, spread the brakes, grass, &c. over the whole surface of the yard. There is no danger of getting this covering of too great a depth. It should be suffered to remain in this situation till the next fall, when, together with the dung and urine of cattle with which it is mixed, it makes an excellent manure, and should be carted out and laid in large heaps, for the purpose of being placed in the hills of Indian corn, or potatoes, the ensuing spring. It is believed that this is the most profitable method of making and applying such manure. If used the spring after it is made, it is not sufficiently rotten or decomposed to become the proper food of plants. It may be worth observing that the practice of covering the barn yard with brakes is very beneficial to the cows kept in the yard during the fall season, and is equally as necessary as the stable litter in the winter. These weeds are very injurious to our pastures, and every cutting tends to destroy them.

The hog yard. With a little labor much valuable manure may be made in this enclosure. It is strong, rich and oily, and the fermentation of it proceeds slowly, consequently it affords more steady and durable nourishment to the plants to which it is applied, than most other manures, and answers a good purpose when mixed with a large quantity of earthy or vegetable substances.

For the purpose of increasing the quantity of this manure, the farmer should deposit in his hog yard at every convenient opportunity, chip-dung, rich earth, weeds, leached ashes, leaves, moss, turf, and such other substances as his ingenuity may suggest; for no person should allow himself to be an entire book farmer, or servile imitator. That the mixture of the several ingredients may be more readily and efficiently be performed by the swine, a little corn or other grain should be sprinkled over the yard.

This is a good manure to enrich the exhausted soil of a garden, or to spread on land to be planted with Indian corn; but perhaps the best manner of applying it is to cart it out every spring, and place it in the hills of Indian corn, or potatoes. If the crop be not a good one where this manure is used, we must look for the failure from some other cause than the want of an excellent manure.

The compost heap. Manures combined of different materials, and of such substances as are calculated to act upon each other by fermentation, or otherwise, are eminently useful in increasing the fertility of soils, and promoting the growth of vegetables.

Select some convenient spot not far distant from

* This enclosure is usually denominated by the farmers a barn yard, and this appears to be the most proper designation; but most writers on agriculture call it a farm yard.

the back part of your house, or near the barn yard, and cart or place thereon, not in layers, but judiciously mixed or shovelled together, such substances as the following, viz. rich earth, such as may be obtained from ditches or the sides of the road; mud or the dirt from hollows, which have received the wash from rich lands; marl, ashes, oily substances, soot, putrified flesh, dead animals may be buried in the compost heap, if placed at such a depth as to prevent any noxious effluvia; woollen rags cut in small pieces, scrapings of the cellar and kitchen yard, of lanes and back yards after rains, rubbish of old chimneys, earth that has been long under cover, salt, old brine, blood and soap suds. These should be frequently mixed together, and at each stirring much common earth, or that which lies adjoining the heap, may be added. If this manure be designed for a cold, stiff, clayey soil, sand or dry sandy loam should be a principal ingredient; but if for open, light, sandy ground, clay should be added. It would be well to add to the heap some warm manure to promote its fermentation; sheep dung would be the best. Straw, refuse fodder, brakes, or any such vegetables, would be better disposed of in the barn yard than in this heap. The making of such a heap causes an appearance of neatness to exist about the house and other buildings; and besides being a rich manure, the removing of so much rubbish to its proper place is conducive to the health of the occupants or inmates of the house.

This is a good manure to spread on tillage land, just before sowing it with wheat or any kind of grain and hay seed. It should be covered in the soil with the harrow. It will cause the grain to grow luxuriantly, and the land seldom fails of being well stocked with grass. It may be profitably applied to gardens, and as a top dressing to wet, cold mowing lands.

Peat moss, or swamp mud. This is a substance which yields little or no nourishment to plants unless it be mixed with barn yard or stable dung, or some kind of hot manure to bring it into a state of fermentation; in this case the mixture may be used in the same manner and nearly to the same effect "weight for weight as barn yard dung."

The cheapest and best manner of making this kind of compost manure is, when the barn yard dung is carried into the field early in the fall, a certain quantity, say one-half, or even two-thirds of the heap may be composed of swamp mud, which should be well mixed with the other manure. The whole mass at this time will undergo a strong fermentation, and become a good manure. Some practise carting swamp mud into the barn yard; but in this case the two kinds of manure will not so well assimilate by fermentation, as when they are both moved at the same time and mixed together. The mud should be removed from the swamp, and left to dry some weeks before it is carried to the compost heap. I tried some of this compost in the hill for corn and potatoes, on a dry warm soil; it consisted of nearly two-thirds mud; it did well with the potatoes, but with the corn, barn yard dung had the advantage, though in this case the mixture was probably beneficial.

APPLICATION OF MANURE.

In addition to what has been before remarked

on this subject, some further observations will be made, founded on information derived from my own experience, the best authors, and the most intelligent agriculturists.

Stable dung or animal manure ought to be spread on tillage land designed for corn or potatoes the spring after it is made, and well mixed with the soil, by the harrow first and then the plough. This mixing of the dung and soil should be performed immediately after the manure is carried from the heap to the field. If the small heaps are suffered to remain in the field during a fermentation, there is great loss of heat, of volatile fluid, oily, and gaseous matter, by their dissipation in the atmosphere, which would, if the dung be speedily and properly buried in the ground, be communicated to the soil, thus securing to the plants the most nourishing properties, and the whole strength of the manure.

As it respects their speedy application, the same remarks apply to all kinds of manure, as well as to that of stable dung.

Some are of the opinion that stable and farm yard manure ought always to be applied in a recent state, that is, previous to their rotting or decomposition. In this case the manure must be spread on the land as above directed, as new dung will not answer a good purpose to place in the hill for Indian corn; and it is not so good on most soils for potato hills, as that which is somewhat decomposed and rotten. Barn yard dung may profitably be applied, as before observed, in the hill of corn and potatoes; and if so applied it should not be applied in a recent state.

With regard to the quantity of manure to be applied to an acre of tillage, many circumstances must be taken into consideration, such as the strength of the soil, the kind of grain or produce to be raised, (Indian corn requiring the largest quantity) and the kind or quality of the manure to be applied. The farmer, in making his calculations on this point, should not apportion his manure to the quantity of ground he may wish to place under tillage; but should apportion his ground to the quantity of manure he can command. "Scanty dressings," as the term is, should ever be rejected. "We till too much land," is an expression in very common use; but instead of being a vague speculation of the brain, it should be reduced to the actual practice of the hand.

In the speculation of manure, the quality of the soil and of the manure should be considered. A cold, stiff, clayey, or wet soil requires a hot fermenting manure, and one not much decomposed, and that too in considerable quantity, that the cold nature of the soil may be corrected by the warmth of the dung; on the contrary, a dry, warm, sandy soil requires dung more decomposed and putrified, and a less quantity answers a good purpose. On such soils a compost of dung and peat moss, as before described, is a very suitable manure.

REMARKS ON AGRICULTURE, VEGETATION, &c.

To the Editor of the Farmers' Register.

Nothing is of more importance than the cultivation of the soil, and improvement of agriculture. I have read with pleasure and satisfaction many communications on this subject, in your

useful paper. It is indeed pleasing to see gentlemen of the first standing in society, come forward and give information upon this all important subject. I hope they will go on and use every exertion to promote the welfare and happiness of the Old Dominion. We have paid but little attention to agriculture: indeed it has been most shamefully neglected. The reason appears obvious: we have more land than we can cultivate, and there will be a waste until necessity compels us to improve. What, I might ask, has been the mode of cultivation for a century past? It has been, to get as much land cleared as possible, make a few indifferent crops, and pay little or no attention to it afterwards. In a few years the soil is carried, by frequent washings, down hills, branches, creeks and rivers, until it reaches the Atlantic; the sterile earth and gullied fields put up pine, and ultimately the inhabitants are driven from necessity beyond the mountains. This Virginia can witness; and I am sorry to say, many of us are going on in the old way, without any ambition to excel our predecessors. It is true, we have some industrious characters, who are disposed to benefit society free from self interest, and it is much to be regretted, that this laudable spirit is not more general.

Nothing is wanting but a correct system of agriculture, to make us the most independent people upon earth—we should therefore endeavor to improve this great science, and supply, if possible, the general and lamented defect. I feel disposed to call upon the enlightened part of the community, to use their influence in producing a change; they alone have it in their power, and if they will use exertion, they can effect a revolution in a short time. Let us then take in consideration all that relates to the cultivation of the soil, although it may require years to perfect the great object.

The earth is a mean by which plants are supported and nourished. There are five primitive earths which are generally found in most countries, viz. siliceous, lime, magnesia, alumina and barytes; by a particular union of these earths, are formed the great variety of stones observable on the surface of our globe; in many instances, they are united with various acids, forming salts. The gypsum, for instance, is a salt composed of the sulphuric acid and lime; all the rock, lime, shells, and various marbles, are salts composed of the carbonic acid and lime. These earths taken separately, are unfit for vegetation. Siliceous retains heat and is destitute of moisture; argillaceous earth, cold and humid; calcareous earth caustic, and gives out water too freely; magnesian earth, sterile and destitute of any active properties. They are, however, so opposed, that they correct each other when united. Farms abounding with argillaceous earth, may become productive by the addition of lime and plaster: by this union, the lime is robbed of its humidity and the adhesive quality of the clay destroyed. The earths taken separately, will not constitute manure, and we have to study the soil before we attempt the improvement. The great secret in agriculture, is a proper union of earths, together with various agents to be named hereafter. The good effects to be derived from the primitive earths, must be owing to the affinity which they have for each other; atmospheric air, water, vegetable and animal productions, hasten-

ing decomposition. In consequence of this affinity, a great variety of gases are the immediate result, which act as stimulants on the tender germ or root of plants; so that the earths afford no real nourishment in themselves, but act entirely as exciting agents—they decompose every thing for which they have an affinity. In consequence of this, a number of gases are evolved, and when united, form various fluids, such as sap, sugar, water, oil, and mucilage. By this union plants are formed, their growth depending upon the facility with which the productions of the earth are decomposed. The rapid growth of plants, or their tardiness, must depend upon hasty or slow decomposition, for unless some animal or vegetable putrefaction is taking place constantly upon the earth's surface, plants cannot subsist. This observation is applicable to the animal, as well as the vegetable kingdom, for nothing can exist except it be from something which had previously perished. Composition and decomposition are continually taking place; and without it, there can be no vegetable or animal matter.

To be successful in making a crop, many things are to be taken in consideration. First, we must have rich earth, for without it, there can be no luxuriant vegetation. The prosperity of the plant depends upon a variety of causes. We should endeavor to learn what kind of manure has the greatest affinity for the earth we have in cultivation. The soil should be properly prepared before we attempt the seeding, for unless this is done, it would be a vain effort to produce an effect without a cause. I beg leave here to drop a hint to Virginia farmers and planters; they cultivate too much poor land, and labor hard for little profit. If they would manure their lands, and cultivate half the quantity, they would have full barns and fat stock; as it is, they have empty corn houses and lean kine. It is, however, the disposition of Virginians to hold out appearances; if they can give you the outline of a large field of corn or tobacco, they seem perfectly satisfied, knowing that it will not be filled up. From two acres of ground, under favorable circumstances, a planter will make 1000 pounds of tobacco: when carried to market it is found defective in quality, and sold at the reduced price of \$5 per cwt., which amounts to \$50: whereas, if the same labor and manure had been given to one acre of land, 1000 pounds of tobacco of the first quality would be made, and of course it would command the first market price, \$10 per cwt., which amounts to \$100: thus it is, that the planter labors hard throughout the year, and yet finds himself poor.

The next thing to be taken in consideration in making a good crop, is select seed. The seeds of vegetables are a sexual offspring, corresponding with the eggs of animals, and contain like them, not only the rudiments of new organization, but also a quantity of aliment laid up for its early nourishment. (See Darwin's Phytologia). When seed is deposited in the earth, having a due degree of heat and moisture, it soon begins to germinate; the germ has a number of small umbilical or seminal vessels, which in a short time imbibe fluids from the earth and atmosphere; they are excited into action by the stimulus of fluids which come in contact with their mouths: the germ at length begins to unfold itself and we observe the trunk, leaves and branches, having a number of arteries,

veins, muscles, tendons, nerves, glands and absorbents. The plant now requires the necessary agents to act upon it in order to produce its evolution.

The third consideration in making a crop is judicious culture or proper manual labor. The plough hastens decomposition by exposing the various matters in the earth to the action of the sun and air: this causes a greater affinity to exist between the principles which go to the nourishment of vegetables. It likewise leaves the earth loose and suffers the tender roots to creep along in search of food. When the roots extend any distance from the hill or stalk, they should not be broken, for this would retard the growth of the plant, by cutting off a portion of its nutriment; this is not all, every wounded root produces disease in the plant, and it must require some time before it is capable of healthy action. It not unfrequently happens, that we fail in making a crop, and ascribe it to drought or wet, when it was owing entirely to our own imprudence, that of injudicious culture.

A due degree of heat is necessary to the well being of all vegetables. The temperature *most favorable* to vegetation, has not, I believe, been correctly ascertained; but I suspect a temperature varying between 55 and 85 degrees of Fahrenheit's thermometer is best. There should be a degree of heat sufficient to keep up vegetable and animal putrefaction, in order that the plant may constantly receive a certain portion of aliment. A high temperature decomposes the various matters of the earth too rapidly, and carries them off in the atmosphere, before the plant can get possession of them; it also robs the earth of a certain portion of moisture necessary to vegetation.

Plants, like animals, cannot live without water; they require a drink when thirsty; they decompose water, and its components form some of the rudiments of plants; other gases enter into their composition no doubt: but I am well assured, water must be decomposed before it gets possession of the vegetables; otherwise, plants would be composed principally of that fluid. Water is a compound of oxygen and hydrogen in certain proportions, and it may readily be imagined, that it is by various affinities reduced to its principles, giving organization and fluidity to the vegetable world. Plants receive their nourishment from water, through the medium of the earth, which acts as a filter, and carries with it, while in a state of decomposition, certain principles, which are the immediate product of decayed animal and vegetable productions. Insects that are continually dying on the surface and in the earth, support plants; for when we consider that it contains such a variety of animals, visible and invisible, that every spire of grass, every leaf, and all kinds of matters are loaded with insects throughout the vernal, summer, and autumnal months—that one generation is succeeding another continually—all this I say seems to be a plain proof, that the vegetable world must be in a great measure supported by them. Such an idea may seem visionary, but it cannot be doubted, unless we deny the existence of principles from the earth which go to the nourishment of plants. Atmospheric air, is one of the vegetable supporters. They, like animals, cannot live without it, although the air they feed upon, is somewhat different from that

required for the animal creation. Nitrogen gas supports vegetable life; plants are observed to be vigorous in proportion to the quantity of this gas present. Carbonic acid gas is an agent that supports vegetation; plants are healthy in earth mixed with finely levigated charcoal. As plants acquire growth, their principles are materially changed. We first observe nothing more than a thin fluid resembling mucilage. As they acquire age, this mucilage is changed to a substance resembling oil, known by the name of sap, from which all the fluids are formed by secretion. There is a wonderful similarity between the vegetable and animal world; they are both governed by the same laws, the various agents that act upon them are similar, their organization in many respects the same, and they both possess motion, sensation and life.

GALEN.

REMARKS ON AGRICULTURAL SOCIETIES, AND THE FARMERS' REGISTER AS AN AUXILIARY.

To the Editor of the Farmers' Register.

I had been long anxious to see an organ, for the conveyance of agricultural information, like that presented in the Farmers' Register; and as I had abandoned the culture of tobacco, for the sole purpose of improving my farm, it comes in a time of need, and I shall want all the materials it can furnish. We do indeed, sir, want something for the improvement of the *practice* of agriculture. We want facts founded on certain, accurate, and well conducted experiments. I think with you, we have inefficient talking and speechifying societies enough: where to use an old saying, we have "all talk and no cider." These societies are easily formed, and as easily exploded. I would by no means, however, decry agricultural societies; they are very useful, in fact all-important, to keep up a spirit of improvement, if they effect nothing else. Nor am I opposed to the principle of carrying important points by societies in general: without them nothing valuable can be accomplished. Man, like some of the inferior ranks of animals, may be considered gregarious—compelled from necessity to associate, for mutual support and defence. What is man unassisted, unassociated, and alone? Look at him as he appears at his first entrance into the world; he is of all animals the weakest and most defenceless. But view him in society, hedging himself around with the accumulated knowledge and experience of ages, yet, in a state of progressive improvement, (which appears to be the most distinguishing feature by which his intellect is marked from inferior ranks,) and he bids defiance to the whole round of animated nature, and wields the whole vegetable kingdom for his convenience and support. Take a savage, for instance, in the midst of his wild native woods, and how long would it take him to arrive at the present state of improvement in the arts and sciences? "If men did not assist each other, no operation of any magnitude, or which could show any great superiority of talents above those of the brute creation, could possibly be effected. A single family, or even a few families united, like the carnivorous animals, might hunt their prey and procure a sufficient quantity. They

might, like the bear, lodge in the cavities of trees; they might occupy natural caves in the rocks; they might even build huts with branches of trees and with turf, and cement those materials with clay. This lowest and most abject view of human nature is not exaggerated. It were to be wished that this grovelling condition of mankind were fictitious, and that, in many regions of the globe, it did not at this moment exist. These operations of men, when only acquainted with the rudiments of society, indicate parts little superior to those of brutes. Man even in his most uninformed state, possesses the capacity for every species of knowledge and every exertion of genius. But it may be cherished, expanded, and brought gradually to perfection. It is by numerous and regularly established societies alone, that such glorious exhibitions of human intellect can be produced. What is the hut of a savage, when compared to the palace of a prince? Or what is a canoe, when compared to a first rate ship of war?"

But, sir, the failure of these societies, when they have failed, may be attributed generally, to some of the following causes. First, they commence reformation, as almost all reformations of mankind do begin, not by improving on existing plans and systems, but an entire abolition of present practices, as if all the world who had gone before us lived for nought, and labored in vain. The following couplet is a good rule here—

"Be not the first that new things try,
Nor last to lay the old ones by."

They spend all their zeal and energy, in talking about what they are going to do, without actually doing. They expect too great a reformation at once—they lack perseverance—are generally too speculative and theoretical in their character, and finally, the want of some agricultural paper, has been no small obstacle, to act as a kind of nucleus to keep these associations together, and to confine public attention to the subject; and which will, at the same time, convey their proceedings, improvements, discoveries, and inventions to each other, and the community. With these and other errors corrected, by close and minute attention to the operations of our farms, great things may be accomplished.

I am delighted, however, with the *practical* character of the Register, and particularly with the following traits. Its extreme condescension to little matters, which are generally the most useful, though overlooked in house-keeping and farming. It has been too much the defect of books and periodicals in general, as well as of great men, that they disdain the common and useful concerns of life, and go to speculating upon matters that are of no service to mankind: and are more admired for the strangeness and uncommonness of the things they treat of, than their utility. In a word, their concern with every thing which mankind have no use for, and nothing, which they have. They are, likewise, too general in their character; not minute enough, as Goldsmith remarked of the natural historians who preceded him. "They contented themselves with seizing upon the great outlines of history, and passing over what was common, as not worth the detail; they only dwelt upon what was new, great, and surprising, and sometimes even warmed the imagination at the expense of truth." I should be

fond to see agriculture reduced to something like a system, and like medicine and other sciences, have its theory and its practice, its botanical names, its technical language, &c.; but not all theory and no practice. We need a reformer, sir, and a reformation in agricultural science, such as Bacon was, and such as he effected in natural philosophy: who after the world had been bewildered, and I might add bewitched, by vain speculation for centuries, substituted experimental, in the room of speculative philosophy; and taught mankind, that observation and experiment were the great fountains of human knowledge: and I know of no other means better calculated at present of effecting this change among us, than you and your Register, to which all should endeavor equally to contribute, how feeble soever their efforts and humble their attainments, if they wish it to live to a good old age.

There is another feature of the Register with which I am remarkably well pleased; that is, its passing by the imperfections of style and language, and publishing useful matter, from whatsoever quarter it may come. Writing, sir, is a troublesome thing to many of us, and authors are something like sparrows, they are ever dreading the hawk-eye of the critic; and if we are to write, then scratch out and write again—look in the dictionary—ransack our imaginations for images, to write about common sense matters; then revise and correct, &c.—we presently become weary, and find not a little of our time slipping away. But if we can only give you the matter, without much regard to the manner—the chaos, and let you make a world of it—you will hear from some of your friends a little oftener. I have little doubt, that there is a vast deal of sound and useful knowledge, suppressed among the best informed and practical farmers of your subscribers, for fear of meeting with the eye of the critic where the great mass of matter lies, which is to feed the Register and keep it alive; and where we must look chiefly for support of the practice of agriculture. This is its strong hold: the most elegant writers are not always the most practical farmers; on the contrary, we are too often, by attempting a pretty style, or at least a studied one, betrayed into poverty, and sometimes even into entire loss of thought. I do not pretend to say that these two qualities may not be admirably combined, as they are by some of your correspondents. We like to see good language, as well as botanical names and technical words introduced into agricultural instruction; for it could be wished that agriculture like chemistry, had its technical language, that the same words were always used to convey the same ideas, and its language was not so vague and indefinite, sometimes using one word (as "fallow") to convey several different ideas, and several words to convey the same idea. But as each one has words and phrases peculiar to himself, in this infant branch, we wish those who first introduced them, would explain themselves to simple and plain farmers, for actually there are some, who write so philosophically and learnedly about common matters, that at first it appears to be something the world never saw, and when we come to find it out, it is something we have been used to all our lives. Simple subjects, says a good author, should be treated with simple words, and we ought not to "hedge around plain and simple matters with hard

words, accumulated distinctions, ostentatious learning, and disquisitions that produce no conviction." The cultivation of different crops, and the variety of pursuits among planters, farmers, and graziers, &c., living at a distance from each other, in different climates, and under different circumstances, in countries at different stages of improvement, introduce among them, in the extensive subject of agriculture, a certain slang of words and phrases, that are not always understood by their brethren pursuing a simple branch, and living in a different county, and therefore needing explanation, that others should be benefited by their remarks. And here, by the by, is one excellent characteristic of the Register, it appears to be better acquainted with our pursuits, and manners, and customs, and while we are reading it, we seem to be reading about our neighbors.

There is still another feature which I cannot forbear to commend, and that is, the illustration of subjects by engravings, &c., which are not easily done by words. There are subjects, it is well known, such as those that treat of implements of husbandry, machinery, accounts of animals, &c., of which all the verbal description in the world, would fail to give us a proper idea; in such cases, a simple drawing would aid the understanding more than volumes of words on the subject; besides saving a good deal of room. The admirable portraits you have given us in No. IV, is an example of this, a single glance at which, will give us a better idea of the qualities of a good bull or cow, than folios on the subject. "Mr. Locke (says Goldsmith) with his usual good sense, has observed, that a drawing of the animal taken from life, is one of the best methods of advancing natural history; and yet most of our modern systematic writers, are content rather with describing. Descriptions (continues the last author) no doubt will go some way towards giving an idea of the figure, but they are certainly much the longest way about, and as they are usually managed, much the most obscure. In a drawing, we can at a single glance gather more instruction, than by a day's painful investigation of methodical systems, where we are told the proportions with great exactness, and yet remain ignorant of the totality. In fact, this method of describing all things, is a fault that has infested many of our books that treat on the meaner arts for the last age. They attempt to teach by words, what is only to be learnt by practice and inspection. Most of our dictionaries and bodies of arts and sciences are guilty of this error. Suppose, for instance, it be required to mention the manner of making shoes, it is plain that all the verbal instruction in the world, will never give an adequate idea of this humble art, or teach a man to become a shoemaker. A day or two in a shoemaker's shop, will answer the end better than a whole folio of instruction, which only seems to oppress the learner with the weight of its pretended importance: we have lately seen a laborious work carried on at Paris, with this only intent, of teaching all the arts by description; however, the design at first blush seems to be ill considered, and it is probable, that very few advantages will arise from so laborious an undertaking. With regard to the descriptions in natural history, these without all question, under the direction of good sense, are necessary, but still they should be kept within proper bounds; and when a thing may

be much more easily shown than described, the exhibition should ever precede [or accompany at least] the account." It is desirable, therefore, that in original pieces, those who treat on subjects of the nature above mentioned, would ever accompany them with drawings, especially if the invention is entirely new.

But not to trouble you any longer, sir, with remarks of so general a character, for which my admiration, and sincere desire for the utility and success of the Farmers' Register, only could atone, permit me to make use of your valuable organ, besides, for a few other little fragments of facts, which you may register as you think proper. I begin with a

NEW MODE OF PRESERVING SWEET POTATOES,

which I practiced last winter with complete success. Though one experiment alone, would seem insufficient to establish a fact under all circumstances, yet success in the first instance invites repetition, and all those who wish may try it this winter, as it is extremely cheap and simple. It is to keep them in hogsheds, surrounded with straw stacks, fixed as follows:—

Erect a circular platform of earth, about a foot from the common surface, about the area of the end of a hogshhead, with earth dug out of a circular ditch around the platform; then spread some straw or chaff on it, and set the hogshhead thereon. Now pour in your potatoes on some chaff or straw, placed at the bottom of the hogshhead inside, to within a foot of the top, taking care to chink in straw or chaff between the potatoes and the staves as you fill it, and sprinkling some also, occasionally, between the potatoes, to absorb the redundant moisture arising from them while sweating, or any that may adhere to them when put up. The cask may be placed in the middle of your potato ground; and the potatoes must be spread and dried, about a day before stored—when the dirt dries on them, is a good rule to go by. After this, insert three stakes equidistant around the hogshhead, and erect straw stacks around them, in the common way; with this difference, that a man must be walking the whole time the stack is making, around the hogshhead, ramming in the straw close and tight against the side of it, to prevent the admission of cold air. The design of the stakes is to steady the stack, and to confine the straw around the hogshhead. If the potatoes are for table use, a hole may be made near the bottom of the cask, large enough to admit the arm easily, through which they may be taken at any time; taking very particular care to cram straw and chaff in the hole afterwards. My potatoes, put up in this way last winter, when disturbed for planting, were perfectly sound and plump, and free from that disagreeable scent and odor, contracted in a kiln of earth. Sweet potatoes may be preserved in heaps on the firm stable-yard, covered with manure, by which they are kept warm—in pits in the ground, with chaff, leaves, &c.—in kilns of earth—in hogshheads in a smoke-house, a certain length of time, kept warm by the fire and smoke. But the method above mentioned, is far preferable to either, being the cheapest, safest, and best for preserving the taste and plumpness of the root. They may also be kept in potato houses, and cellars in cabins. I might have mentioned, the principle or rationale

of this practice is, that while the cold air is excluded, the potatoes are not smothered for want of air, to dry off the sweat, and prevent heating; the material with which they are protected, being at the same time, airy and warm enough: too much air, or too little, are the two extremes to be avoided in preserving this root.

DRIED FRUIT,

such as peaches and apples, &c., may be elegantly preserved by heating before storing. This destroys the eggs and worms that are deposited on the fruit while drying, by flies, that afterwards corrupts the fruit. The fly frequently deposits instead of eggs, the living worm—this I have seen myself.

POSTS

for railing, gates, &c., may be preserved for a much greater length of time, by making them without butts, or shoulders. It may be observed, that posts always begin to decay at the surface of the earth; the reason of this is, the shoulder catching the water that trickles down the post, it remains there for a long time, soaking into, and rotting the wood, till it finally tumbles to the earth. This has been attributed to the wood maggot; but in truth, this insect comes after the post begins to decay, to feed on the rotten wood, its natural food. It may be objected, that the post in this way is not so firmly fixed in the ground; but this may be remedied by gravel, and ramming. Even a pine post fixed in this way, will out last several oak ones. Pines skinned the proper length, by using a ladder to ascend them, and permitted to stand a year or more, will make handsome and durable posts, (perhaps as much so as cedar.) By leaving a circular strip of bark, about a hand's breadth, to keep the sap in circulation, (which part may be afterwards painted) the tree becomes coated with a thick layer of rosin, which when exposed to the atmosphere, becomes white as if painted. The inserted end of the post, is to be sawed off even and smooth, smeared thick with tar, and a board nailed on it; this and the light-wood around the post, which is an inch or two deep, will preserve it.

TAR—THE PINE TREE—WOOD FOR FUEL.

Tar may be made in abundance from the light-wood of pines treated in the manner above.

The utility of the pine tree, (I mean the field pine) would furnish a subject for a good essay: there is no tree of the woods, which at first sight is apparently so useless, yet is more useful than the pine; nor any one thing, scarcely, that is applicable to a greater variety of purposes. It furnishes coal for the shop; tar in abundance, which is here made from the knots, but in North Carolina from the green wood also, called green tar, which is inferior to dry tar, being thinner, and containing a good deal of water, and pyroligneous acid, which acts upon the metal. It is made there from the pitch pine (*pinus palustris*.) A pile of the pitch pine twenty feet in diameter, and fourteen feet high, yields 200 barrels of tar. In Sweden and Norway, it is made from the Scotch fir, (*pinus sylvestris*) where being manufactured in brick furnaces, it is cleaner and more marketable. All the French and Bourdeaux tar is made in this manner, from the sea pine, (*pinus maritima*) after the trees have been exhausted of turpentine, by in-

cision; as is also much of the American. The carter and waggoner, the varnisher and painter, the manufacturer of gunpowder, of soap and candles, the shoemaker, brush maker and tinner, the blacksmith, and more than all, the farmer, is indebted to the pine. Tar furnishes a very good varnish for vessels, and rosin is made from it, by burning down or boiling it. Turpentine is made on a large scale, by incision of the living pine, that is afterwards used for tar. The pine affords a good material for rails, which although not as durable as oak or ash, yet being more abundant, more easily cut, and more yielding to the wedge, it is a cheaper timber, especially if we add to their durability by skinning before mauling, or permitting to lie afterwards a while, until the bark (which rots the rail) will slough off in handling. It is certainly the quickest of all restorers of an exhausted and impoverished soil, where the land is put upon its own resources for restoration, since it is dependent upon the soil for but very little support, the roots drawing their nourishment far beneath the surface, from the clay, or subsoil; (whereas clover, or other vegetation, needs a start first from the soil, by manuring, before it can enrich the earth much;) and by being again felled on the land, by their shading influence, which mellows the earth, and in conveying a powerful coat of vegetation, besides its fertilizing property, sooner than any thing else, restores the land to its original strength. It affords also the best material for retaining the soil, for stopping gulleys, and seems to have risen up around these awful cavities, bequeathed us by our ancestors, for the very purpose, as well as a kind of gloomy reproof, of their land destroying system. It may be worth while to mention, that the tops and limbs of the pine is the very best stuff for repairing the breaches of dikes, dams, &c. The pine affords the cheapest and most economical fuel, and is decidedly the best wood for burning bricks, making the hottest fire, and free from the damp rainy vapor, arising from green wood, which half the time puts the fire out, acting as so many pails of cold water. According to Mr. Bull's experiments on forty-six varieties of wood, and twenty of coal, it appears that the dry pine wood, (which has received more philosophical attention than some would suppose) affords as much heat as eight of them—that is, the white ash, apple tree, American chestnut, white elm, shell-bark hickory, mountain laurel, Lombardy poplar—and more than all the rest. The experiments were made by ascertaining the time 10° of heat were maintained, above the common temperature, by the combustion of one pound of each article, burnt in a sheet iron cylinder stove, with forty-two feet of two inch pipe, in a room where a thermometer was placed. The experiments were extremely accurate: the heat was maintained 6 hours 40 minutes. The pine used was of different kinds—red cedar, (*juniperus Virginiana*), Jersey pine, (*pinus inope*), pitch pine, (*pinus segida*), white pine, (*pinus strobus*), yellow pine, (soft) (*pinus mitis*); the last kind mentioned, the heat rather less than the others, 6 hours 30 minutes. The other wood maintained it different degrees, but all less than the nine above mentioned.

Pine, as all other kinds of wood, should be burnt in a dry state; for these reasons: First, dry wood affords more heat. Several experiments

made by Count Rumford, show the effect of dry wood much greater than that of unseasoned wood. Unseasoned wood contains one-third of its weight of water: with his improved boilers, Count Rumford made twenty pounds of ice cold water boil, with one pound of dry pine wood; the same weight of pine wood unseasoned, would produce less effect by one-seventh; one in every seven pounds of green wood is, therefore, lost in combustion, in the fire place. It was ascertained by Mr. Bull, that 100 pounds of green white oak contained 41 pounds of moisture, and that $13\frac{1}{2}$ per cent. of the combustible matter of this green oak is consumed, in converting 41 pounds of moisture into steam, or driving it up the chimney; and of course, in all ordinary cases, is a dead loss. We may calculate then, to lose $13\frac{1}{2}$ per cent. of heat in every 100 pounds of green wood we burn.

Secondly, the great quantity of heat that is absorbed by this aqueous vapor or steam, after it is driven from the wood. Green wood, it was found by the last author, is nearly twice as heavy as dry or seasoned wood: soft maple, it was ascertained by him, lost 48 per cent. in drying. "If we assume then (says he) the mean quantity of moisture in the woods, when green, as 42 per cent., the great disadvantage in attempting to burn wood in this state must be obvious; as in every 100 pounds of this compound of wood and water, 42 pounds of aqueous matter must be expelled from the wood; and as the capacity of water or absorbing heat is nearly as four to one when compared with air, and probably greater during its conversion into vapor, which must be effected before it can escape, the loss of heat must consequently be very great." In fact, I incline to think, that the weight of green over that of dry wood, is much over half, if all the moisture was expelled; for I do not consider the moisture entirely expelled, until the wood is converted into charcoal; if so, then as 100 pounds of dry pine wood contains only 23.75 parts of coal, according to experiments, we have but 23.75 per cent. of combustible matter in 100 pounds of dry pine, to produce heat or fire; for all the heat that is given out, in burning wood, is owing to the charcoal it contains. What a quantity of heat then is absorbed by the aqueous vapor of 100 pounds even of dry pine, for if we subtract 23.75 from 100, it leaves about 77 pounds of aqueous vapor, smoke, pyroligneous acid, &c., to absorb and carry off the heat. But the effect is still greater with green wood. If 100 parts of dry pine yield but 23.75 of charcoal, and 100 pounds of green wood contain 41 pounds of water, then 100 parts of green pine, will yield but 12 parts of coal, which is all the combustible matter we have, to produce heat in 100 pounds of green wood; and if this be taken from 100, it leaves 88 per cent. of aqueous vapor and smoke, to absorb the heat and carry it up the chimney; and 88 per cent. of heat is lost in burning green wood in an open fire place; which agrees nearly with the results of Dr. Franklin, that the old open fire places, lost 95 per cent. of heat; and with Mr. Bull, that even in the present improved Rumford fire places, there is a loss of 90 per cent. But besides the heat lost in green wood, in converting the sap into vapor, and by absorption, it requires an additional quantity of combustible matter, or dry wood, to expel enough sap from the wood, to set it a burning, or in other words, to kindle it. Unless this

heat then absorbed and carried off by the particles of aqueous vapor or steam, is confined in the apartment, (as it may be done by close stoves and pipes, for steam is extensively used in heating rooms) it must be entirely lost: some idea of which loss may be formed, when we consider that one cubic inch of water, will expand into 1728 cubic inches of steam; and of course, one cubic foot of water or sap, (which weighs 62½ pounds) will swell out, or expand, into 1,388,400 cubic inches of steam or watery vapor, carrying off with it, an amazing quantity of heat into the atmosphere; which is necessary to uphold it in its expanded state, and if suddenly condensed by cold, will be again given out.

Thirdly. A great number of smoky chimneys may be cured by burning dry wood; for as many of them smoke, chiefly at the kindling, or making the green wood burn, if dry wood was used, it would burn off immediately, and by producing a draught, would dispel the smoke up the chimney.

Fourthly. *Less* wood is required, to produce the same fire or degree of heat. The common opinion is, that it requires more of dry than of green wood, to make the same fire. But when we consider the quantity of dry wood required to set the green wood on fire, and keep it burning—the slow combustion afterwards—the quantity of heat lost by expelling the water from the wood—and the vast quantity absorbed or swallowed up by steam—it must require a great deal less of dry, than of green wood, to generate the same uniform degree of heat, or quantity of fire.

Fifthly. It is certainly more *healthy* to burn dry wood, especially in sick rooms. Few persons seem to have considered the impropriety of putting wet or green wood on the fire place, considering the great volume of watery vapor that is expelled from it. If wetting or washing the hearth, or the drying of wet clothes before a fire, be deleterious to health, certainly the burning of sappy, or at least wet wood must be.

Sixthly. It affords much less *soot* when seasoned wood is burnt; for, producing a greater degree of heat, it consumes more of the soot, and this heat, of course, causing a stronger draught, the residue of the soot is driven out of the chimney: besides, not half the soot is formed; for as soot is the unconsumed particles of the matter of the wood, produced by a slow and imperfect combustion, it is almost entirely consumed in the quick hot fire produced by dry wood.

Seventhly. The combustion is more rapid, and of course the heat is greater. Other reasons might be assigned, but it is sufficient to mention at present, that the draught is stronger and better in a fire place where seasoned fuel is consumed: and as the management of a fire place depends wholly upon this, it will further appear, how much advantage the seasoned, has over that of the unseasoned wood, from considerations on the construction of the fire places.

From this it would seem that there is little reason, or at least little economy, in spending so much combustible matter, (or in other words, using so much of the wood, in drying the balance before it can burn) when this could be done in the sun and wind, and the balance used for fuel.

We might also from these facts, improve our economy in clearing land; instead of burning the

wood in heaps as usual, stack it to season it, and it will be good for twenty years or more.

But these remarks are more applicable to pine wood, which although unfit for fuel in a green state, yet when dry, gives as much heat, and perhaps more, than any of the woods in common use for fuel, such as oak, hickory, &c., and certainly more than all the swamp woods. For this purpose it might be belted and allowed to stand, or cut down, mauled, and stacked.

NICHOLAS E. READ,
Twittie's Creek, Charlotte County.

EVILS OF THE ROAD LAW, AND HINTS FOR ITS AMENDMENT.

To the Editor of the Farmers' Register.

Rockbridge, Dec. 30th, 1834.

I am much pleased to find one of your correspondents in the last Register (No. 7) has taken up the subject of our defective *road law*, and is determined in future numbers to point out the evils arising therefrom. And what place more fit for the discussion of this question, than in a work devoted to the interests of agriculture? For without roads to convey the products of our farms to market, sufficiently good to prevent the freight overrunning the profits, there would be an end to all incitement to enlarge our crops. It is indeed wonderful that a law so vitally important to the best interests of the state, should so long have been suffered to disgrace our statute book, without almost any effort on the part of the legislature to alter or amend it, until the last winter, and then not until the heel of the session, when the minds of the members were more occupied with the approaching electioneering canvass, than with legislation. But it is one of the evils of the present political excitement, that our representatives *will not* venture on any innovation on established usage—or *cannot* indeed with safety, for fear it will be seized on by their political opponents as a pretext to eject them from their seats. It is nevertheless true that our legislature is more prone to the discussion of hair-splitting abstractions, than to more practical business legislation; and whilst they are *talking*, other legislatures are *acting*, and outstripping us in every species of public improvement. But those of our legislature of strong talking propensities, might find ample materials to feast their appetites in portraying the inequality—and therefore the injustice, as well as the utter *inefficiency* of our present road system. A little reflection will point out to them the ample room for complaint daily heard by the surveyor of every precinct, where the sturdy yeoman is compelled to perform his task along side the menial slave; whilst the exempted master is indulging in ease and idleness at home; and this it is, that drives much of the bone and sinew of our state from its borders. It may be that this is a mechanic having a son of sixteen, or upwards, annually renting the house to shelter his family, without waggon or horse, and yet in consequence of the present odious features of the law, is obliged to give the public highways the same amount of labor in *propria persona*, as does the owner of two slaves with permanent residence, and perhaps thousands vested in waggons or stages. The poor fellow with scarcely the means to buy the

hoe or mattock for himself and son, delves hard on the road all day, whilst his more fortunate neighbor rolls by in his pleasure carriage unconcerned at the unequal privileges granted him by the law. Depend upon it, to retain this useful class of citizens amongst us, and prevent them from emigrating to states where their rights are better guarded, we must make a thorough and radical change in our road system. I hope your correspondent R. N. will not relax his efforts in this cause until he points out the benefits resulting from the more equal and just road law of Pennsylvania and Ohio, and what is not less important, their *much greater efficiency*. I would suggest to the consideration of R. N. the propriety in the first place of the state appointing an engineer who is fully competent, and will firmly discharge his duties, to review, and re-locate where necessary, all the stage routes of the commonwealth, placing them on the surest and best ground, with an eye solely to the benefit of the *public at large*, regardless of the murmurs of a single individual, who will perhaps grumble though benefitted. And to prevent the possibility of doing injustice to such individual, and the heavy damages given by juries, I would make it the duty of the county courts to ascertain the *actual value* of such lands, and pay over to such individual such actual value at so much per acre. Thus it would be impossible as now, for an obstinate selfish person to obstruct a work of great public utility; or to bribe a sheriff (for they are like other men) to summon juries, whose sentiments he is acquainted with, and who he knows will give exorbitant damages; and we must not forget too, the more flaws, and the less satisfactory these verdicts are to the courts, the better for the sheriff, for he is paid \$5 (often more than the condemned land is worth) for every jury summoned.

When the roads are thus located by an able and perfectly disinterested engineer, they should be given up to the county courts, whose duty it should be to appoint commissioners for roads, to be paid for their services out of the *road fund* to be raised by a moderate tax for that purpose, and whose duty it would be to apply such funds to the hire of laborers, for opening and keeping in repair the roads—giving to those interested, the option to pay the tax assessed for that purpose, in money, or in work at a fair per diem allowance. But I have already exceeded my limits and must leave the subject to the abler pen of R. N.

R. R. B.

CEDAR HEDGES.

To the Editor of the Farmers' Register.

Cumberland Stony Point Mills, }
26th Nov. 1834.

You will confer a singular favor on me, and others who are now present, requesting that I should apply to you for information in relation to live fencing from the cedar, which abounds here in great numbers. At what season should transplanting take place, and how should they be planted—deep or shallow, the size of the bush, &c.?—and when and how the berries should be drilled? It is alleged by a gentleman now present, that they will come up freely after passing through the body of a robin, and that they do not come up from sim-

ply placing them under ground. Is this so, or not? Please to write freely and fully to this point.

SAMUEL HOBSON.

[We cannot answer the foregoing inquiries better than by giving the following extract from Taylor's *Arator*, on cedar hedges. Our personal experience on this subject is very limited—but such as it is, its fruits are readily offered. For the purpose of testing the means of overcoming the first difficulty, (that is, the transplanting, without killing or materially injuring the young cedars,) a row of eight or ten yards' length was set out as recommended by Taylor, (except being in a single line.) The trial was made in a foul bushy piece of ground which formed part of a hog lot, and on a compact clay soil. The young cedars stood very thick around, so that they could be transplanted without being moved more than a few yards. A trench was first dug about ten inches deep, and rather wider than the spade. Each plant was dug up in a square mass of soil, of the width of the spade, and from six to ten inches deep, and immediately lifted and placed in the trench. The interstices were afterwards filled with loose earth, and the whole then trodden down so as to be compact. No farther care was used, nor any after-tillage, or protection from the trampling of the live-stock—and yet by the next summer only one of the plants was killed, or apparently injured by the change of place. But this want of care, and the growth of a cedar thicket over the whole space, of course served to thin the plants, and destroy its hedge-like appearance. The trial was only intended to show if the transplanting could be safely effected, and in that respect, it was successful. The plants varied from six to eighteen inches in height. If a distant removal had been necessary, the labor and the risk would have been greatly increased. No attempt was made to apply the plan to use for enclosing fields, because live fences can never succeed in Virginia so long as the law permits hogs to range at large, and debars the owner of a field from all remedy for their depredations. Whenever this objection is removed, the sowing of the cedar seeds will probably be found a cheaper mode than transplanting. It is supposed, that they will not vegetate until after having passed through the body of some animal: but the same end may be reached by using a proper degree of artificial heat. Bordley found the same difficulty with the seeds of hedge thorns, and overcame it, both by mixing them with the food of cattle, and by keeping them in a moderately warm fluid for several days, after which they sprouted well.—See *Bordley's Husbandry*.]

From Taylor's *Arator*.

Live fences.—This subject, so extremely material to a country requiring to be raised from the dead, by vast and repeated doses of the only genuine terrene elixir, testifies in every quarter of the United States, to the scantiness of our agricultural knowledge; and is one of the presages, that it is doomed to live and die an infant. If it is an idiot, its case is hopeless; but if it is only a dunce, it must in time discern the vast saving of labor to be applied to draining and manuring, the vast saving of

wood and timber for fuel and building, and the vast accession to arable, by rendering less woodland necessary, as acquisitions arising from live fences.

In the "Memoirs of the Agricultural Society of Philadelphia," several modes of raising live hedges, suitable for different soils and climates, are stated and explained. Two volumes of these memoirs have been published, containing more valuable information upon the subject of agriculture, than any native book I have seen; and if we have no relish for the wit, learning and experience, with which they abound, but little good can be expected from these ephemeral essays. To say much upon a subject, copiously handled in a book which every farmer ought to have, would insinuate the existence of a general apathy towards the eminent talents which have presided over, and greatly contributed to its composition; to say nothing, would be a neglect of a subject of the utmost importance.

Several plants are mentioned in these memoirs as proper for making live fences, but I shall confine my observations to one, because my knowledge experimentally, does not extend to the others. The cedar is peculiarly fitted for the purpose, throughout a great district of the United States. It throws out boughs near the ground, pliant and capable of being easily woven into any form. They gradually however become stiff. Clipping will make cedar hedges extremely thick. No animal will injure them by browsing. Manured and cultivated, they come rapidly to perfection. The plants are frequently to be found in great abundance without the trouble of raising them. As an ever-green they are preferable to deciduous plants; and they live better than any young trees I have ever tried, planted as follows:

From December to the middle of March, the smallest plants are to be taken up in sod of a square conformable to the size of the spade used, as deep as possible, which sod is to be deposited unbroken in a hole as deep made by a similar spade; the earth coming out of it being used to fill up the crevices between the sod and the hole for its reception. I plant these cedars on the out and inside of a straight fence, on the ridge of a ditch, the plants in each row being two feet apart both in the direction of and across this ridge; but so that the plants on one side of the fence will be opposite to the centre of the vacancies between those on the other. Each row will be one foot from the fence, so that the top of the ridge will be about eight inches higher than the position of the plants. They should be topt at a foot high, and not suffered to gain above three or four inches yearly in height, such boughs excepted as can be worked into the fence at the ground. Of these great use may be made towards thickening the hedge, by bending them to the ground, and covering them well with earth in the middle, leaving them growing to the stem, and their extremities exposed. Thus they invariably take root and fill up gaps. If these hedges are cultivated properly, and the land is strong, they will form an elegant live ever-green fence, in a shorter time than is necessary to raise a thorn fence in England, according to the books.

But will they keep out hogs? I am told by travellers that few or none of the hedges in England will do so. Yet hedges are both the chief agricultural ornament, and most valuable improvement of that well cultivated country. But hogs are not there turned loose by law to assail them. I do

however think that a cedar hedge is far more capable of forming a fence against hogs than the thorn, because one, as a tree, will acquire more strength or stubbornness than the other, a shrub, can ever reach; and because the cedar is capable of being worked into a closer texture than the thorn.

Yet the wedge-like snout of the hog, the hardness of his nature, and the toughness of his hide, certainly exhibit him as a dangerous foe to live fences; and the resources of ringing and yoking to control his powers and his disposition, ought to be adverted to, for the sake of an improvement so momentous.—These will not shock our prejudices nor violate our habits, and are supported by a consideration of weight, far inferior to the importance of hedging; and yet light as it is, of weight sufficient to justify the recommendation. If hedges are not protected against hogs, at least four rows of plants, and a double width of ring and bank will be necessary; there must be a double sized ditch to furnish this earth; a double portion of land will be occupied by the hedge and ditch; and more than double labor, owing to the inconvenience arising from great breadth, will be always required to keep the hedge in order. Something less than moieties in all these cases will suffice for hedges capable of fencing out every other animal, if the legal rights of hogs are only modified, and besides the narrow hedges will be far more beautiful.

PROFITS OF SILK CULTURE IN FRANCE.

Sixth letter of M. Amans Carrier to M. Bonafous, Director of the Royal Garden of Turin, upon the culture of mulberry-trees in the department of Aveyron.

Translated for the Farmers' Register, from the *Annales de l'Agriculture Française*.

Rodez, February 15, 1834.

SIR—Having sold the silk of my last crop at Lyons, I can now fulfil the promises of my letter of the 15th of last July, by giving you the definitive result of my management of 1833, and by showing you the improvements introduced in the filature (or winding) of our cocoons.

A circumstance fortunate for the country has brought near us M. Marchetti, an Italian (political refugee) and skilful *filateur* of silk. This young stranger has given me excellent counsels—all of which I am anxious to make use of whenever it is convenient. It is to him (and I give him many thanks) that I owe a part of the good procedure, which I have adopted this year, and which has been very much appreciated by the connoisseurs of Italy and Lyons.

He has also had the goodness to present me with a complete model, (and on a large scale) of a stove to wind the silk, accompanied with the parts and additions indispensable for the operation. This beautiful work, which would deserve to be placed in a public exposition, has been made entirely by his own hands, and from his memory. Although this apparatus presents the advantages of economizing half of the hand work and two-thirds of the fuel, I have not been able to try it yet, inasmuch as none of the winders whom I have under my direction, have had the courage to undertake a like labor. Without doubt we will make the trial some time hence.

Obliged to return to our old method, I have had two furnaces constructed in better proportions than formerly: the winders watched with more attention; the water has been filtrated; the number of threads have received a new measure more regular than formerly; their size has been better regulated. All this care has given me products infinitely more beautiful than in the preceding years.

The first thing to be done, before you wind the cocoons, is, to stifle the crysalides, to prevent them from cutting through. You know that the means made use of now to kill them is very long, and often dangerous. The use of an oven is not always at the disposal of those who produce silk on a small scale; and, besides, from the want of practice, or of intelligence, they run the risk of burning the cocoons by submitting them to a heat too great, or by leaving the crysalides alive, if the heat is not at the proper degree, which is certainly not easy to determine. Killing them by steam is more used, and at the same time more sure; nevertheless, it has the disadvantage of soaking the cocoons and softening them, so that (after the operation) much heat is required to dry them; and when the weather does not permit exposure to the sun, you must have recourse to a stove. It is also known that this operation (by steam) deprives the silk, particularly the white, of the beautiful lustre so much desired by the manufacturers.

I have used, this time, a stifter, constructed in a manner extremely simple, which is, I believe, altogether new in France. This was established with us, under the design and direction of M. Marchetti. The trial I have made of it has given the most happy results. You can smother ten times more cocoons in one day (at the regular heat of 70 degrees Réaumur) than by the common way, and economize firewood considerably.

I will now show you the account of the sale of my silk of 1833. I shall take care to subtract the expenses, and you may see the clear profit.

29½ kil. white silk at 63 fr. the kil.	1,839f. 60c.
2½ inferior [doublon] silk at 18 fr. the kil.	44 95
	1,884 55
Deduction for portage, - - -	16 00
	1,868f. 55c.
Value of the different materials coming from the remains of the filature, used at my house, - - -	115 00
Sum realized, - - -	1,983f. 55
For the expense of management, - 171f. 75c. }	435 60
For the filature, 263 85 }	
Sum of the product of last raising,	1,548f. 95

To appreciate the advantages of the cultivation of the mulberry, one must only remember, that this sum 1,548 fr. of profit (after deducting all the expenses) is the product of leaves furnished by trees which have occupied for 8 years on an average, a piece of ground rather less than half a hectare or at most two *sélérees*, a local measure.

Having given you the result of this labor in money, permit me to show you the goodness, and

particularly, the beauty of the silks of Aveyron. The two following facts are sufficient.

M. Marchetti sent a sample of my silk to one of his countrymen of Italy: he received from Topombrone this answer:

"I have waited until now to answer your interesting letter of the 11th of September last, that I might have the opinions of all my friends (cultivators of silk) upon the sample. I will say in the first place, that the silk of Rodez yields in nothing to the best silk of the countries in Italy. But what appears still more surprising, that Rodez obtains a pound of silk from a much less quantity of cocoons. We may conclude that the climate of that country is excellent for mulberry trees, since the leaves are juicy at the proper season, and the management is excellent there."

M. Bonnaves, merchant at Rodez, has had the goodness to trouble himself with presenting and selling at the market of Lyons the silk which I have obtained; to accomplish this task better, he has concerted with M. Benezech, also our countryman, and silk merchant in this last city. These two friends were desired to examine before the sale, the good and bad qualities of this product of Aveyron with the greatest severity.

The verbal report of M. Bonnaves and the letter of M. Benezech, which confirms it, will show to what class the silks of this department belong, when they are obtained every where with the care which is pointed out to us.

I copy this letter:

"Lyons, 1st Feb., 1834.

"M. AMANS CARRIER—After your letter of the 22d of last month, I was very anxious, at your request, to show your produce in silk to very experienced connoisseurs, who have not hesitated to do justice to the care which you have bestowed on your filature this year. White silk is the most sought after, and yours is of a perfect white; it wants neither plianthness or strength.

Take care to advise the silk raisers of the country not to allow the water to be too warm (for in that case the lustre of the silk is injured) to cleanse the large bunches, not to leave double cocoons, and to recommend to the winders when one cocoon is wound to put in another, so that the thread may always be the same size. The number of 4, 5, or 6 cocoons suit better than 8. If your share had been wound from 4 cocoons, it would have sold much higher.

Have the goodness to make these observations to your friends of Rodez, who have great need to pay attention to them in their products. All this negligence has caused their little shares of silk to sell at only 58 fr. the kil. while yours sold at 63 fr.

Mr. Bonnaves will put into your hands for your part 1,868 fr. 55 c."

The result of all these facts appear to me very proper to enlighten the most obstinate minds, and above all, to encourage those who recoil at the difficulty of the management, and the trouble of the filature. If they did me the honor to consult me on this subject, I would reply that there is no species of industry which is employed with as much readiness as this, in all possible divisions, and which leaves to each separate part a considerable profit, having regard both to the employment of capital and to the labor which is required. I would take for example my management of this year and I would say to them, as follows:

The proprietor who wishes to occupy a plantation of mulberry trees, supposing he had already at his disposal a quantity equal to those which I stripped last spring and in the same condition, (that is) producing 160 quintals of leaves at 4 fr. the quintal. Well! this proprietor could have obtained from half a hectare of ground with no other expense than that of cultivating the trees, a revenue of 640 fr. or 320 fr. for each *sêlée*, composed of 640 square fathoms.

The person who would have bought this quantity of leaves to devote himself only to the raising of silkworms, would have had (as I did) 928 pounds of cocoons, and would have sold them at 1 fr. 50 c. a pound, according to the course of that time: this sale would have produced,

	1,392fr. 00c.	
Deduction of expenses, purchase of about 8 ounces of eggs at 3 fr. - - - - -	24fr. 00c.	
Expense of all kind for the management, - - - - -	171 75	
Price of 160 quintals of leaves at 4 fr. - - - - -	640 00	
Rent of the room, - - - - -	60 00	

His part of the profits for 40 days attendance, - - - - - 496 25

The filateur who buys the cocoons obtains a quantity of silk equal to mine and sells it in the same manner, - - - - - 1,868fr. 55c.

He draws from the remains, - - - - - 115 00

Total, - - - - - 1,983 55

It is necessary to deduct from this sum as the cost of 928 pounds of cocoons at 1 fr. 50 c. - - - - - 1,392fr. 00c. } 1,655 85

Expenses of the filature, 263 85 } 1,655 85

Clear gain of the winder, - - - - - 327 70

The laborer, with a family, takes for his share the remains of this filature, employs his wife and children to prepare and wind the low and different qualities of silk, which are in much request and readily sold. These products can be valued, after having received all the suitable work, 165fr. 00c.

Deduction for the purchase of the first materials, - - - - - 50fr. 00c. } 80 00

Hand work, although gained by the family, - - - - - 30 00.

Profit, without including his work already paid, - - - - - 85 00

A simple recapitulation will make the result better understood than this division of the labor, which division certainly agrees, in many cases, with the taste or situation of persons who neither wish, nor are able, to undertake all parts of the business.

The land owner who sells 160 quintals of leaves at 4 fr. receives, - - - - - 640fr. 00c.

The person who buys them and manages the raising, gains, - - - - - 496 25

The winder who takes charge of the cocoons, winds them, and receives for his labor, - - - - - 327 70

The laborer who works up the remains does the labor for 30 fr. and gains besides, - - - - - 85 00

Sum equal to the total profit which I have made by the union of all these operations, - - - - - 1,548 95

The calculations which I have just presented, speak loudly enough without my adding the least observation to make the evidence more sure; I will only say that one of the great benefits of this direction of industry is to make a considerable mass of work for all classes of society, and for all ages. Here is good St. Simonism, which it is necessary to encourage, and in favor of which I should like to see apostles and preachers rise.

I arrive at the object of the letter which you did me the honor to address to me on the 31st of last month, and which informs me that the Royal and Central Society of Agriculture, of Paris, wishing to profit by your presence in this capital, has charged you to present to it a report on the condition of the industry of silks in the parts of France, where it has been recently introduced. You desire, sir, that I should show you our progress, for the purpose of classing in your work the department of Aveyron in the rank which belongs to it. To satisfy this request, I hasten to profit by the documents which are at my disposal, and in uniting them, I dare hope that you will find there all the desired elements.

I will at first acquaint you with a speculation made at Milan in 1833, on a part remarkable enough for cocoons, in the end to try to introduce the filature of silk on a large scale in this city.

This operation has been made on the account of M. M. Brouillet, & Co., and directed by a skillful lady originally from the Cevennes.

The atelier of this filature has had, for nearly three months from 7 to 8 *tours en roulement*, giving different qualities of silk, according to the goodness and the color of the cocoons.

Here is the account, truly certified, which has been communicated to me by this house.

The general produce of the filature has been as follows:

235 ³⁰/₁₀₀ kil. of silk of various qualities, sold at different prices, according to the times, for the sum of 13,300fr. 00c.

Advances to deduct, 3,091 ³⁰/₁₀₀ kil. cocoons bought at the mean price of 3 fr. 30 c. the kil., - - - - - 10,239fr. 75c. } 11,964 75

Expense of the filature, - - - - - 1,725 00

Clear gain for the undertaking, - - - - - 1,335 25

An experiment crowned with such success will be a powerful encouragement for the future.

The following account will determine you on the progress of the culture of the mulberry in Aveyron. This estimate cannot be of the most rigorous accuracy, but it approaches truth as nearly as possible, because it is the result of conscientious instructions which have come to me from all parts of the department.

Of the 5 *arrondissemens* of which it (Aveyron) is composed, 4 have taken a part more or less in the progress of the mulberry plantations. That

of Villefranche ought to be noted as entirely foreign to this new industrious and agricultural conquest. This neglect is much more to be regretted, as this locality offers (as do all the others) the most favorable positions for the growth. If M. Dupin made the statistics of the plantations of mulberry trees, he would mark, and correctly, the entire perfection of Villefranche with his blackest ink.

General table of the plantation of mulberry trees and of the management of silk-worms, in the department of Aveyron, in 1833.

Mulberry trees of large size, (<i>a haute tige</i>) planted.		Total.	Dwarf mulberry trees.	In nurseries.	No. of the cocoons of he raising of 1833.
before 1819.	from 1819 to 1833.				
9,350	26,260	35,000	6,000	67,000	kilog. 10,000

I hope that these statements may be agreeable to you, and show the high estimation which I attach to the extending of an industry upon which you have spread so much light. I would also desire much that my countrymen, so often admonished, may be willing to decide on profiting by your advice and instruction. They know that the mulberry tree grows very well in our department; that they have resisted two trials the most severe that a tree could bear; I speak of the 17 or 18 degrees of cold during the winters of 1829 and 1830, and the extreme heat and long drought of the summer of 1831. At both of these periods, so different, and so extreme, the chestnut trees, the walnuts, the oaks, and many other indigenous trees sustained with us very great damages. They know, by the accounts which have been given, and many by their own experience, that the rearing of worms have succeeded beyond their hopes, when they have been well conducted. They know (and I give new proofs of it now) that our country has produced for a long time silks of the best quality. They also know that the sale of this merchandize is certain, prompt, and advantageous. In short, they know all that is necessary to be known for this new industry, with the best established confidence. Well! if there are some undecided or timid minds among the Aveyronese who wish to wait for better or more positive results, I have faith enough in the good judgement, and I know too much of the intelligence of the greater part among them, to fear that the number is large: and although I am tolerably far advanced in the career of my life, I dare hope that I may be permitted to see one day, that my efforts have not been completely foreign to the prosperity of my country.

AMANS CARRIER.

From the Genesee Farmer.

WILLOWS AND GRAPE VINES FOR HEDGES.

Mr. L. Tucker—Although I have not been a strenuous advocate for hedges as fence, believing they were generally harbors for weeds, and took too much ground, yet there are circumstances which render them very proper. Many years ago a friend of mine had about ten acres of swamp land, so

miry that he could not make a good fence; on this swamp he planted a double row of yellow willow cuttings nine inches apart, making the rows break joints—these, in about three years, had grown from twelve to sixteen feet high—they were then lopped about six feet from the ground and the tops brought down. After this a row of blue grape vine cuttings was planted one every three feet, along the willows—these in a few years climbed the trees, and have yielded a plentiful crop of grape juice, which has been sold to the distilleries, and furnished a good income; so that the proprietor has not only a good fence but a fruitful one. This land was divided by small narrow ditches, nine inches wide and six deep, every four rods—then between these ditches, when the ground was frozen, he carted on a quantity of pit sand, by which means the water was thrown each way to these narrow ditches, and the land sown with red top grass, and has for more than twenty years yielded a plentiful crop of hay annually. This land, since my remembrance, was considered worthless, but now yields an income of more than two hundred dollars per annum.

R. M. WILLIAMS.

Potter, Nov. 29, 1834.

From the Library of Useful Knowledge—Farmer's Series.

GENERAL HISTORY OF THE HORSE.

The native country of the horse cannot with certainty be traced. He has been found, varying materially in size, in form, and in utility, in all the temperate, in most of the sultry, and in many of the northern regions of the Old World.

In the sacred volume, which, beside its higher claims to stand at the head of the Farmer's Library, contains the oldest authentic record of past transactions, we are told that, so early as 1650 years before the birth of Christ, the horse had been domesticated by the Egyptians. When Joseph carried his father's remains from Egypt to Canaan, "there went up with him both chariots and horsemen."* One hundred and fifty years afterwards, the horse constituted the principal strength of the Egyptian army. Pharaoh pursued the Israelites with "six hundred chosen chariots, and with all the chariots of Egypt."†

If we could believe the accounts of the uninspired historians, Sesostris (the monarch probably whom Joseph served) had twenty-seven thousand chariots of war; and Semiramis, the founder of Babylon, had one hundred thousand chariots, and a million of horsemen; but this was probably a great exaggeration.

Fifty years after the expulsion of the Israelites from Egypt, and 1450 years before the birth of Christ, the horse was so far naturalized in Greece that the Olympic games were instituted, including chariot and horse races. We have, therefore, sufficient evidence that the horse was at a very early period, subjected to the dominion of man, and, unfortunately, for the worst of purposes—the business of war.

From the records of the Old Testament, we are likewise enabled to ascertain the precise period of time, when in Egypt and Canaan, and the neighboring countries, this animal began to be domesti-

* Gen. i. 9. † Exod. xvi. 7.

cated. 1920 years before the birth of Christ, when Abraham, having left Harar, in obedience, to the divine command, was driven into Egypt by the famine which raged in Canaan,* Pharaoh offered him sheep and oxen, and asses and camels. Horses would doubtless have been added, had they then existed, or had they been subdued in Egypt.

When, fifty years afterwards, Abraham journeyed to Mount Moriah, to offer up his only son, he rode upon an ass, which, with all his wealth and power, he would scarcely have done, had the horse been known.†

Thirty years later, when Jacob returned to Isaac with Rachel and Leah, an account is given‡ of the number of oxen, sheep, camels, goats, and asses, which he sent to appease the anger of Esau, but not one horse is mentioned.

It is not until twenty-four years after this, when the famine devastated Canaan,|| and Jacob sent into Egypt to buy corn, that horses are first heard of. "Waggons," probably carriages drawn by horses, were sent by Joseph into Canaan to bring his father to Egypt. It would seem, however, that horses had been but lately introduced, and were not numerous, or not used as beasts of burden; for the whole of the corn, which was to be conveyed some hundred miles, and was to afford subsistence for Jacob's large household, was carried on asses.

It appears, then, that about 1740 years before Christ, horses were first used in Egypt; but they soon afterwards became so numerous as to form a considerable proportion of the Egyptian army: and when the Israelites returned into Canaan, the horse had been introduced and naturalized there; for the Canaanites "went out to fight against Israel with horses and chariots very many."§

The sacred volume, therefore, clears up a point upon which no other record throws any light—namely, the period when the horse first became the servant of man, at least in one part of the world, and that the most advanced in civilization, and before Greece was peopled. A long time must have elapsed before man was able to ascertain the value and peculiar use of the animals that surrounded him. He would begin with the more subordinate—those which were most easily caught, and most readily subdued; and the benefits which he derived from their labors would induce him to attempt the conquest of superior quadrupeds. In accordance with this, the writings of Moses shew us that, after the ox, the sheep, and the goat, man subdued the ass, and then the camel, and, last of all, the horse became his servant: and no sooner was he subdued, and his strength and docility and sagacity appreciated, than the others were comparatively disregarded, except in Palestine, where the use of the horse was forbidden by divine authority, and on extensive and barren deserts, where he could not live.¶

*Gen. xii. 16. †Gen. xxii. 8. ‡Gen. xxxii. 14.

||Gen. xlv. 19. §Joshua xi. 4.

¶When Sir Gore Ouseley travelled through Persia, and the different countries of the east, he examined, among other relics of antiquity, the sculptures on the ruins of Persepolis, and he draws from them a curious and interesting conclusion as to the manner in which the horse was gradually subdued. "There are no figures," says he, "mounted on horseback, although some travellers have mentioned horsemen among those

From Egypt the use of the horse was propagated to other and distant lands; and, probably, the horse himself was first transmitted from Egypt to several countries. The Greeks affirm, that Neptune struck the earth with his trident, and a horse appeared. The truth is, that the Thessalians, the first and most expert of the Grecian horsemen, and likewise the inhabitants of Argos and of Athens, were colonists from Egypt.

The Bible likewise decides another point, that Arabia, by whose breed of horses those of other countries have been so much improved, was not the native place of the horse. Six hundred years after the time just referred to, Arabia had no horses. Solomon imported spices, gold, and silver, from Arabia,* but all the horses for his own cavalry and chariots, and those with which he supplied the Phœnician monarchs, he procured from Egypt.†

In the seventh century after Christ, when Mahomet attacked the Koreish near Mecca, he had but two horses in his whole army; and at the close of his murderous campaign, although he drove off twenty-four thousand camels, and forty thousand sheep, and carried away twenty-four thousand ounces of silver, not one horse appears in the list of plunder.

There is a curious record of the commerce of different countries at the close of the second century. Among the articles exported from Egypt to Arabia, and particularly as presents to reigning monarchs, were horses.

In the fourth century two hundred Cappadocian horses were sent by the Roman emperor, as the most acceptable present he could offer a powerful prince of Arabia.

So late as the seventh century, the Arabs had few horses, and those of little value. These circumstances sufficiently prove that, however superior may be the present breed, it is comparatively lately that the horse was naturalized in Arabia.

The horses of Arabia itself, and of the south-eastern parts of Europe, are clearly derived from Egypt; but whether they were there bred, or imported from the south-western regions of Asia, or, as is more probable, brought from the interior, or northern coast of Africa, cannot with certainty be determined.

sculptures. One would think that the simple act of mounting on a horse's back would naturally have preceded the use of wheel-carriages and their complicated harness; yet no horsemen are found at Persepolis; and we know Homer's horses are represented in chariots from which the warriors sometimes descended to combat on foot, but the poet has not described them as fighting on horseback. The absence of mounted figures might authorize an opinion that those sculptures had been executed before the time of Cyrus, whose precepts and example first inspired the Persians with a love of equestrian exercises, of which, before his time, they were wholly ignorant."—vol. ii. p. 276.

* 2 Chron. ix. 14.

†The historian gives us the price of the horse and the chariot at that time. A horse brought from Egypt including, probably, the expense of the journey, cost one hundred and fifty shekels of silver, which, at two shillings, three pence, and one half farthing, each, amounts to about seventeen pounds two shillings. A chariot cost six hundred shekels, or sixty-eight pounds, eight shillings; a most enormous sum at that early period, but little to him who expended more than thirty-five millions of pounds, in gold alone, to ornament the Temple which he had built. † 2 Chron. i. 17.

THE DIFFERENT FOREIGN BREEDS OF HORSES.

The Wild Horse.

Troops of wild horses are found in the plains of Great Tartary, and also in several parts of South America. In neither, however, can we recognise an original race. The horses of the Ukraine, and those of South America, are equally the descendants of those who had escaped from the slavery of man. The Tartar horses are fleet and strong, but comparatively of an ordinary breed. Those of South America retain, almost unimpaired, the size and form of their European ancestors.

In no part of America, or of the more newly-discovered islands of the Pacific, was the horse known until he was introduced by Europeans; and the origin of the horses of Tartary has been clearly traced to those who were employed in the siege of Azoph, in 1657, but which were turned loose for want of forage.

All travellers, who have crossed the plains extending from the shores of La Plata to Patagonia, have spoken of numerous droves of wild horses. Some affirm that they have seen ten thousand in one troop. They appear to be under the command of a leader, the strongest and boldest of the herd, and whom they implicitly obey. A secret instinct teaches them that their safety consists in their union, and in a principle of subordination. The lion, the tiger, and the leopard,* are their principal enemies. At some signal, intelligible to them all, they either close into a dense mass, and trample their enemy to death; or, placing the mares and foals in the centre, they form themselves into a circle and welcome him with their heels. In the attack, their leader is the first to face the danger, and, when prudence demands a retreat, they follow his rapid flight.

In the thinly inhabited parts of South America it is dangerous to fall in with any of these troops. The wild horses approach as near as they dare: they call to the loaded horse with the greatest eagerness, and, if the rider be not on the alert, and have not considerable strength of arm, and sharpness of spur, his beast will divest himself of his burden, take to his heels, and be gone forever.

Captain Head gives the following account of a meeting with a troop of wild horses, where the country is more thickly inhabited. Some poor captured animals are supposed to be forced along by their riders at their very utmost speed:—"As they are thus galloping along, urged by the spur, it is interesting to see the groups of wild horses one passes. The mares, which are never ridden in South America, seem not to understand what makes the poor horse carry his head so low, and look so weary.† The little innocent colts come running to meet him, and then start away frightened: while the old horses, whose white marks on the flanks and backs betray their acquaintance with the spur and saddle, walk slowly away for some

distance, then, breaking into a trot as they seek their safety, snort and look behind them, first with one eye and then with the other, turning their nose from right to left, and carrying their long tail high in the air."*

The same pleasing writer describes the system of horse-management among the rude inhabitants of the plains of South America. They have no stables, no fenced pastures. One horse is usually kept tied at the door of the hut, fed scantily at night on maize; or at other times several may be enclosed in the *corral*, which is a circular space surrounded by rough posts, driven firmly into the ground. The mares are never ridden, or attempted to be tamed, but wander with their foals wherever they please.

When the *Gaucha*, the native inhabitant of the plains, wants horses for himself or for the supply of the traveller, he either goes with his *lasso* to the *corral*, and selects those, possibly, who on the preceding day had for the first time been backed, or he scampers across the plain, and presently returns with an unwilling, struggling, or subdued captive. When the services of the animals have been exacted, he either takes them to the *corral*, and feeds them with a small quantity of maize, if he thinks he shall presently need them again, or he once more turns them loose on the plains.

Travellers give some amusing accounts of the manner in which all this is effected—Miers† thus describes the *lasso*, simple in its construction, but all-powerful in the hands of the *Gaucha*.

"The *Lasso* is a missile weapon used by every native of the United Provinces and Chile. It is a very strong plaited thong of equal thickness, half an inch in diameter, and forty feet long; made of many strips of green hide, plaited like a whip-thong, and rendered supple by grease. It has, at one end, an iron ring above an inch and a half in diameter, through which the thong is passed, and this forms a running noose. The *Gaucha*, or native Peon, is generally mounted on horseback when he uses the *lasso*. One end of the thong is affixed to his saddle girth: the remainder he coils carefully in his left hand, leaving about twelve feet belonging to the noose-end, in a coil, and a half of which he holds in his right hand. He then swings this long noose horizontally round his head, the weight of the iron ring at the end of the noose assisting in giving to it, by a continued circular motion, a sufficient force to project it the whole length of the line."

When the *Gauchos* wish to have a grand breaking-in, they drive a whole herd of wild horses into the *corral*. "The *corral* was quite full of horses, most of which were young ones about two or three years old. The *capitar* (chief *Gaucha*,) mounted on a strong steady horse, rode into the *corral* and threw his *lasso* over the neck of a young horse, and dragged him to the gate. For some time he was very unwilling to leave his comrades; but the moment he was forced out of the *corral*, his first idea was to gallop away: however, a timely jerk of the *lasso* checked him in the most effectual way. The *Peons* now ran after him on foot and threw a *lasso* over his fore-legs just above the fetlock, and twitching it, they pulled his legs from under him so suddenly, that I really thought the

*These animals are of a different race from those which go under the same names in the Old World, and are very inferior in strength.

†An Englishman once attempted to ride a mare, but he was hooted and pelted by the natives, and thought himself fortunate to escape without serious injury.

Sir John Carr, in his *Northern Summer*, p. 44, states that it is only a short time since mares began to be ridden in Russia.

*Head's *Journey across the Pampas*, p. 258.

†Miers' *Travels in Chile*, vol. i. p. 88.

fall he got had killed him. In an instant a Gaucho was seated on his head, and with his long knife, and in a few seconds, cut off the whole of the horse's mane, while another cut the hair from the end of his tail. This they told me was a mark that the horse had been once mounted. They then put a piece of hide into his mouth to serve for a bit, and a strong hide halter on his head. The Gaucho who was to mount, arranged his spurs, which were unusually long and sharp,* and while two men held the horse by his ears, he put on the saddle, which he girthed extremely tight. He then caught hold of the horse's ear, and in an instant vaulted into the saddle; upon which, the man who held the horse by the halter threw the end to the rider, and from that moment no one seemed to take any further notice of him.

"The horse instantly began to jump in a manner which made it very difficult for the rider to keep his seat, and quite different from the kick or plunge of an English horse: however, the Gaucho's spurs soon set him going, and off he galloped, doing every thing in his power to throw his rider.

"Another horse was immediately brought from the corral, and so quick was the operation, that twelve Gauchos were mounted in a space which I think hardly exceeded an hour. It was wonderful to see the different manner in which different horses behaved. Some would actually scream while the Gauchos were girding the saddle upon their backs; some would instantly lie down and roll upon it; while some would stand without being held—their legs stiff, and in unnatural positions, their necks half bent towards their tails, and looking vicious and obstinate; and I could not help thinking that I would not have mounted one of those for any reward that could be offered me, for they were invariably the most difficult to subdue.

"It was now curious to look around and see the Gauchos on the horizon in different directions, trying to bring their horses back to the corral, which is the most difficult part of their work; for the poor creatures had been so scared there that they were unwilling to return to the place. It was amusing to see the antics of the horses—they were jumping and dancing in different ways, while the right arm of the Gauchos was seen flogging them. At last they brought the horses back, apparently subdued, and broken in. The saddles and bridles were taken off, and the young horses trotted off towards the corral, neighing to one another."†

When the Gaucho wishes to take a wild horse, he mounts one that has been used to the sport, and gallops over the plain. As soon as he comes sufficiently near his prey, "the lasso is thrown round the two hind legs, and as the Gaucho rides

a little on one side, the jerk pulls the entangled horse's feet laterally, so as to throw him on his side, without endangering his knees or his face. Before the horse can recover the shock, the rider dismounts, and snatching his poncho or cloak from his shoulders, wraps it round the prostrate animal's head. He then forces into his mouth one of the powerful bridles of the country, straps a saddle on his back, and bestriding him, removes the poncho; upon which the astonished horse springs on his legs, and endeavors by a thousand vain efforts to disencumber himself of his new master, who sits quite composedly on his back, and, by a discipline which never fails, reduces the horse to such complete obedience, that he is soon trained to lend his whole speed and strength to the capture of his companions."*

These animals possess much of the form of the Spanish horse, from which they sprung; they are tamed, as has been seen, with far less difficulty than could be thought possible; and, although theirs is the obedience of fear, and enforced at first by the whip and spur, there are no horses who so soon and so perfectly exert their sagacity and their power in the service of man. They are possessed of no extraordinary speed, but they are capable of enduring immense fatigue. They are frequently ridden sixty or seventy miles without drawing bit, and have been urged on by the cruel spur of the Gaucho, more than a hundred miles, and at the rate of twelve miles in the hour.

Like the Arab horses, they know no intermediate pace between the walk and the gallop. Although at the end of a day so hard, their sides are horribly mangled, and they are completely exhausted, there is this consolation for them—they are immediately turned loose on the plains, and it will be their own fault if they are speedily caught again. The mare is occasionally killed for food, and especially on occasions of unusual festivity. General San Martin, during the war for independence, gave a feast to the Indian allies attached to his army; and mares' flesh, and the blood mixed with gin, formed the whole of the entertainment.

On such dry and sultry plains the supply of water is often scanty, and then a species of madness seizes on the horses, and their generous and docile qualities are no longer recognized. They rush violently into every pond and lake, savagely mangle and trampling upon one another; and the carcasses of many thousands of them, destroyed by their fellows, have occasionally been seen in and around a considerable pool. This is one of the means by which the too rapid increase of this quadruped is, by the ordinance of Nature, there prevented.

The wild horses of Tartary, although easily domesticated, materially differ in character from those on the plains of South America. They will not suffer a stranger to join them. If a domesticated horse comes in their way, unprotected by his master, they attack him with their teeth and their

*The manufacture of the Gaucho's boots is somewhat singular. "The boots of the Gauchos are formed of the ham and part of the leg-skin of a colt taken reeking from the mother, which is said to be sacrificed for the sole purpose, just at the time of bearing when the hair has not begun to grow. At this stage, the skin strips off easily, and is very white and beautiful in texture and appearance. The ham forms the calf of the boot; the hock easily adapts itself to the heel, and the leg above the fetlock constitutes the foot: the whole making a neat and elegant half-boot, with an aperture sufficient for the great toe to project through."—Andrews's Journey in South America, vol. i. p. 26.

†Head's Journey across the Pampas, p. 258.

*Basil Hall's Journey to Peru and Mexico, vol. i. p. 151. The Jesuit Dobrizhoffer, in his History of the Abipones, a nation of Paraguay, and speaking of "the tamed horse," (vol. ii. p. 113.) says, that "stirrups are not in general use. The men leap on their horse on the right side. In the right hand they grasp the bridle, and in the left a very long spear, leaning on which, they jump with the impulse of both feet, and then fall right upon the horse's back."

heels, and speedily destroy him. They readily submit, however, to the dominion of man, and become perfectly docile and faithful.

Among the Tartars, the flesh of the horse is a frequent article of food; and although they do not, like the Indians of the Pampas, eat it raw, their mode of cookery would not be very inviting to the European epicure. They cut the muscular parts into slices, and place them under their saddles, and after they have galloped thirty or forty miles, the meat becomes tender and sodden, and fit for their table; and, at all their feasts, the first and last and most favorite dish, is a horse's head.

When water was not at hand, the Scythians used to draw blood from their horses, and drink it; and the dukes of Muscovy, for nearly two hundred and sixty years, presented Tartar ambassadors with the milk of mares. If any of this milk fell upon the mane of the horse, the duke by custom, was bound to lick it off.

Troops of wild horses are occasionally met with in the central parts of Africa, in the island of St. Domingo, on the deserts of Arabia, and in a few other parts of the world; but no where do they equal the domesticated horse in form, strength, or even speed.

The Barb.

It has been already stated, that the earliest records we have of the horse, trace him to Egypt, whence he gradually found his way to Arabia and Persia, and the provinces which were colonized from Egypt; and thence to the other parts of the Old World. But Egypt is not now a breeding country, and it does not appear to possess those requisites which could ever have constituted it one. Without, however, entering into the question whether the horse was primarily the inhabitant of some particular region, whence other parts were gradually supplied, or whether it was common to many countries, but differing in each; we have stated it to be probable that the horses of Egypt, the earliest on record, were derived from the neighboring and interior districts of Africa. Therefore, in giving a very summary account of the most celebrated and useful breeds of different countries, it is natural to begin with those of Africa.

At the head of these is the *Barb*, from Barbary, and particularly from Morocco and Fez, and the interior of Tripoli; and remarkable for his fine and graceful action. It is rather lower than the Arabian, seldom exceeding fourteen hands and an inch. The shoulders are flat, the chest round, the joints inclined to be long, and the head particularly beautiful. The *Barb* is decidedly superior to the Arab in form, but has not his spirit, or speed, or countenance.

The *Barb* has chiefly contributed to the excellence of the Spanish horse; and, when the improvement of the breed of horses began to be systematically pursued in Great Britain, the *Barb* was very early introduced. The Godolphin Arabian, as he is called, and who was the origin of some of our best racing blood, was a *Barb*; and others of our most celebrated turf-horses trace their descent from African mares.

More in the centre of Africa, in the kingdom of Bournou, is a breed, which Mr. Tully, in his almost romantic history of Tripoli, reckons superior even to those of Arabia or Barbary; it possesses

the best qualities of both those breeds, being as serviceable as that of Arabia, and as beautiful as that of Barbary.

In the more southern and western districts of Africa, and particularly in the neighborhood of the Guinea Coast, the breed of horses is very inferior. They are small, weak, unsafe, and untractable. But neither horses nor any other produce of value, can be looked for in those unhappy countries, so long as they are desolated by the infernal slave-trade inflicted upon them by the most civilized, but truly unchristian, nations of Europe.

The Dongola Horse.

The kingdom of Dongola, and the neighboring districts lying between Egypt and Abyssinia, contain a horse not at all like any other oriental.

The "Dongola horses stand full sixteen hands high, but the length of the body, from the shoulders to the quarter, is considerably less. Their form, therefore, is opposite to that of the Arabian, or English thorough-bred, which are longer by some inches than they are high. The neck is long and slender, the crest fine, and the withers sharp and high, giving a beautiful forehead; but the breast is too narrow, the quarters and flanks too flat, and the back *carped*. They constitute excellent war-horses, from their speed, durability, and size. Several of them have lately been imported into Europe, but they are little valued. Possibly, with three-part-bred mares, they might improve our cavalry horses."

Bosman, whose descriptions prove him to be no bad horseman, thus speaks of them, but in somewhat too flattering a manner. "The Dongola horses are the most perfect in the world, being beautiful, symmetrical in their parts, nervous and elastic in their movements, and docile and affectionate in their manners. One of these horses was sold in 1816, at Grand Cario, for a sum equivalent to 1000*l*."

Mr. Bruce tells us, that the best African horses are said to be descended from one of the five on which Mahomet and his four immediate successors fled from Mecca to Medina, on the night of the Hegira. He thus accounts for very singular and opposite customs among the Arabs and Africans.

"No Arab ever mounts a stallion: on the contrary, in Africa they never ride mares. The reason is plain. The Arabs are constantly at war with their neighbors, and always endeavor to take their enemies by surprise in the grey of the evening, or the dawn of day. A stallion no sooner smells the stale of the mare in the enemy's quarters, than he begins to neigh, and that would give the alarm to the party intended to be surprised. No such thing can ever happen when they ride mares only. On the contrary, the Funge trust only to superior force. They are in an open, plain country—must be discovered at many miles distance—and all such surprises and stratagems are useless to them."

The Arabian.

Going further eastward we arrive at Arabia, whose horses deservedly occupy the very highest rank.

A few wild horses are yet seen on some of the deserts of Arabia. They are hunted by Bedouins for their flesh, which is considered a delicacy,

if the animal be young; and also to increase their stock of inferior horses, which they often palm on the merchant as descended from the sacred breed. They are said to be even swifter than the domesticated horse, and are usually taken by traps hidden in the sand. Mr. Bruce, however, doubts whether any wild horses are now found in Arabia Deserta.*

Although in the seventh century the Arabs had no horses of value, yet the Cappadocian and other horses which they had derived from their neighbors, were preserved with so much care, and propagated so uniformly and strictly from the finest of the breed, that in the thirteenth century the Arabian horse began to assume a just and unrivalled celebrity.

There are said to be three breeds or varieties of Arabian horses; the *Attechi*, or inferior breed, on which they set little value, and which are found wild on some parts of the deserts; the *Kadischi*, literally horses of an unknown race, answering to our half-bred horses—a mixed breed; and the *Kochlani*, horses whose genealogy, according to the Arab account, is known for two thousand years. Many of them have written and attested pedigrees extending more than four hundred years, and, with true Eastern exaggeration, traced by oral tradition from the stud of Solomon. A more careful account is kept of these genealogies than belongs to the most ancient family of the proudest Arab chief, and very singular precautions are taken to prevent the possibility of fraud, so far as the written pedigree extends.

The *Kochlani* are principally reared by the Bedouin Arabs, in the remoter deserts. A stallion may be procured without much difficulty, although at a great price. A mare is rarely to be obtained, except by fraud and excessive bribery. The Arabs have found out that which the English breeder should never forget, that the female is more concerned than the male in the excellence and value of the produce; and the genealogies of their horses are always reckoned from the mothers.

The Arabian horse would not be acknowledged by every judge to possess a perfect form: his head, however, is inimitable. The broadness and squareness of the forehead, the shortness and fineness of the muzzle, the prominence and brilliancy of the eye, the smallness of the ears, and the beautiful course of the veins, will always characterize the head of the Arabian horse.

His body may be considered as too light, and his chest as too narrow; but behind the arms the barrel generally swells out, and leaves sufficient room for the play of the lungs.

In the formation of the shoulder, next to that of the head, the Arab is superior to any other breed. The withers are high, and the shoulder-blade inclined backward, and so nicely adjusted, that in descending a hill the point or edge of the harn never ruffles the skin. He may not be thought sufficiently high; he seldom stands more than fourteen hands two inches.

The fineness of his legs, and the oblique position of his pasterns, may be supposed to lessen his apparent strength; but the leg, although small, is flat and wiry; anatomists know that the bone has no common density, and the starting muscles of the fore-arm and the thigh indicate that he is fully

capable of accomplishing many of the feats which are recorded of him.

The Barb alone excels him in noble and spirited action; and if there be defects about him, he is perfect for that for which he was designed. He presents the true combination of speed and bottom—strength enough to carry more than a light weight, and courage that would cause him to die rather than to give up.

We may not, perhaps, believe all that is told us of the Arabian. It has been remarked, that there are on the deserts which this horse traverses, no mile-stones to mark the distance, or watches to calculate the time; and the Bedouin is naturally given to exaggeration, and, most of all, when relating the prowess of the animal, which he loves as dearly as his children; yet it cannot be denied that, at the introduction of the Arabian into the European stables, there was no other horse comparable to him.

The Arab horse is as celebrated for his docility and good temper as for his speed and courage. In that delightful book, 'Bishop Heber's Narrative of a Journey through the Upper Provinces of India,' the following interesting character is given of him. "My morning rides are very pleasant. My horse is a nice, quiet, good-tempered little Arab, who is so fearless, that he goes without starting close to an elephant, and so gentle and docile that he eats bread out of my hand, and has almost as much attachment and coaxing ways as a dog. This seems the general character of the Arab horses, to judge from what I have seen in this country. It is not the fiery dashing animal I had supposed, but with more rationality about him, and more apparent confidence in his rider, than the majority of English horses."

The kindness with which he is treated from a foal, gives him an affection for his master, a wish to please, a pride in exerting every energy in obedience to his commands, and, consequently, an apparent sagacity which is seldom seen in other breeds. The mare and her foal inhabit the same tent with the Bedouin and his children. The neck of the mare is often the pillow of the rider, and, more frequently, of the children, who are rolling about upon her and the foal: yet no accident ever occurs, and the animal acquires that friendship and love for man which occasional ill-treatment will not cause him for a moment to forget.

When the Arab falls from his mare, and is unable to rise, she will immediately stand still and neigh until assistance arrives. If he lies down to sleep, as fatigue sometimes compels him, in the midst of the desert, she stands watchful over him, and neighs and rouses him if either man or beast approaches. An old Arab had a valuable mare that had carried him for fifteen years in many a hard-fought battle, and many a rapid weary march; at length, eighty years old, and unable longer to ride her, he gave her, and a scimitar that had been his father's, to his eldest son, and told him to appreciate their value, and never lie down to rest until he had rubbed them both as bright as a looking-glass. In the first skirmish in which the young man was engaged he was killed, and the mare fell into the hands of the enemy. When the news reached the old man, he exclaimed that "life was no longer worth preserving, for he had lost both his son and his mare, and he grieved for

*Bruce's Travels, vol. vi. p. 430.

one as much as the other;" and he immediately sickened and died.*

Man, however, is an inconsistent being. The Arab who thus lives with and loves his horses, regarding them as his most valuable treasure, sometimes treats them with a cruelty scarcely to be believed, and not at all to be justified. The severest treatment which the English race-horse endures is gentleness compared with the trial of the young Arabian. Probably the filly has never before been mounted; she is led out; her owner springs on her back, and goads her over the sand and rocks of the desert at full speed for fifty or sixty miles without one moment's respite. She is then forced, steaming and panting, into water deep enough for her to swim. If, immediately after this, she will eat as if nothing had occurred, her character is established, and she is acknowledged to be a genuine descendant of the *Kochlani* breed. The Arab is not conscious of the cruelty which he thus inflicts. It is an invariable custom, and custom will induce us to inflict many a pang on those whom, after all, we love.

The following anecdote of the attachment of an Arab to his mare has often been told, but it comes home to the bosom of every one possessed of common feeling. "The whole stock of an Arab of the desert, consisted of a mare. The French consul offered to purchase her in order to send her to his sovereign, Louis XIV. The Arab would have rejected the proposal at once with indignation and scorn; but he was miserably poor. He had no means of supplying his most urgent wants, or procuring the barest necessities of life. Still he hesitated; he had scarcely a rag to cover him—and his wife and his children were starving. The sum offered was great—it would provide him and his family with food for life. At length, and reluctantly, he consented. He brought the mare to the dwelling of the consul—he dismounted—he stood leaning upon her; he looked now at the gold, and then at his favorite; he sighed—he wept. 'To whom is it,' said he, 'I am going to yield thee up? To Europeans, who will tie thee close—who will beat thee—who will render thee miserable. Return with me, my beauty, my jewel, and rejoice the hearts of my children.' As he pronounced the last words, he sprung upon her back, and was out of sight in a moment."

The next anecdote is scarcely less touching, and not so well known. Ibrahim, a poor but worthy Arab, unable to pay a sum of money which he owed, was compelled to allow a merchant of Rama to become partner with him in a valuable mare. When the time came, he could not redeem his pledge to this man, and the mare was sold. Her pedigree could be traced on the side of sire and dam for full five hundred years. The price was three hundred pounds; an enormous sum in that country. Ibrahim went frequently to Rama to inquire after the mare: he would embrace her, wipe her eyes with his handkerchief—rub her; with his shirt-sleeves, and give her a thousand benedictions during whole hours that he remained talking to her. 'My eyes!' would he say to her, 'my soul! my heart! must I be so unfortunate as to have thee sold to so many masters and not keep thee myself? I am poor, my antelope! I brought thee up in my dwelling as

my child. I did never beat nor chide thee; I caressed thee in the proudest manner. God preserve thee, my beloved! thou art beautiful, thou art sweet, thou art lovely! God defend thee from envious eyes!"

Sir John Malcolm gives two anecdotes to the same purpose, but of a more amusing nature.

"When the envoy, returning from his former mission, was encamped near Bagdad, an Arab rode a bright bay mare of extraordinary shape and beauty before his tent, until he attracted his attention. On being asked if he would sell her; 'What will you give me?' was the reply: 'That depends upon her age; I suppose she is past five?' 'Guess again,' said he. 'Four!' 'Look at her mouth,' said the Arab, with a smile. On examination she was found to be rising three. This, from her size and symmetry, greatly enhanced her value. The envoy said, 'I will give you fifty tomans' (a coin nearly of the value of a pound sterling.) 'A little more if you please,' said the fellow, apparently entertained. 'Eighty. A hundred.' He shook his head and smiled. The offer at last came to two hundred tomans! 'Well,' said the Arab, 'you need not tempt me further—it is of no use. You are a rich elchee (nobleman.) You have fine horses, camels, and mules, and, I am told, you have loads of silver and gold. Now, added he, 'you want my mare, but you shall not have her for all you have got.'"

"An Arab sheick or chief, who lived within fifty miles of Bussorah, had a favorite breed of horses. He lost one of his best mares, and could not for a long while discover whether she was stolen or had strayed. Some time after, a young man of a different tribe, who had long wished to marry his daughter, but had always been rejected by the sheick, obtained the lady's consent and eloped with her. The sheick and his followers pursued, but the lover and his mistress, mounted on one horse, made a wonderful march, and escaped. The old chief swore that the fellow was either mounted upon the devil, or the favorite mare he had lost. After his return, he found the latter was the case; that the lover was the thief of his mare as well as his daughter; and that he stole the one to carry off the other. The chief was quite gratified to think he had not been beaten by a mare of another breed; and was easily reconciled to the young man, in order that he might recover the mare, which appeared an object about which he was more solicitous than about his daughter."†

One of our own countrymen, the enterprising traveller, Major Denham, affords us a pleasing instance of the attachment with which the docility and sagacity of the horse may inspire the owner. He thus relates the death of his favorite Arabian, in one of the most desert spots of Central Africa. His feelings needed no apology. We naturally honor the man in whom true sensibility and undaunted courage, exerted for useful purposes, were thus united.

"There are a few situations in a man's life in which losses of this nature are felt most keenly; and this was one of them. It was not grief, but it was something very nearly approaching to it; and though I felt ashamed of the degree of

*Smith on Breeding, p. 80.

*Malcolm's Sketches of Persia, vol. 1. p. 41.

†Ibid. p. 45.

derangement I suffered from it, yet it was several days before I could get over the loss. Let it, however, be remembered that the poor animal had been my support and comfort—nay, I may say, companion, through many a dreary day and night; had endured both hunger and thirst in my service; and was so docile, that he would stand still for hours in the desert while I slept between his legs, his body affording me the only shelter that could be obtained from the powerful influence of the noon-day sun: he was yet the fleetest of the fleet, and ever foremost in the chase."

Our horses would fare badly on the scanty nourishment afforded the Arabian. The mare usually has but one or two meals in twenty-four hours. During the day she is tied to the door of the tent, ready for the Bedouin to spring, at a moment's warning, into the saddle, or she is turned out before the tent ready saddled, the bridle merely taken off, and so trained that she gallops up immediately at her master's call. At night she receives a little water; and with her scanty provender of five or six pounds of barley or beans, and sometimes a little straw, she lies down content, in the midst of her master's family. She can, however, endure great fatigue; she will travel fifty miles without stopping; she has been pushed, on emergency, one hundred and twenty miles—and, occasionally, neither she nor her rider has tasted food for three whole days.

To the Arabian, principally, England is indebted for her improved and now unrivalled breed of horses for the turf, the field, and the road, as will be shown when we presently treat of the English horse.

[To be continued.]

From the Louisiana Register.

ON CUTTING DOWN AND WIND-ROWING SUGAR CANE.

The article which we publish to day in relation to the sugar cane in Louisiana, does not speak as strongly in favor of cutting down, or wind-rowing the cane, as the importance of the subject demands. This is doubtless owing to the circumstance that at the time the *Manual* was compiled the custom of cutting down the cane was more a matter of experiment, than a course calculated to save millions annually to Louisiana.

The first trial of cutting the cane which we saw, was made by the late John Anderson, on the Mount Hommas estate in the parish of Ascension, in 1829—9. Soon after the vegetation was destroyed by the frost, which we think was about the middle of November, one acre of cane was put in wind-rows, throwing four rows together in the middle space, after the manner of matressing. Along side of this acre, the cane was left standing, and ground the last, of any of the cane so left; but such was its condition that sugar could not be made from it—not even molasses. On the 26th of January, 1829, the acre of wind-rowed cane was ground, and in the appearance of the juice, and in every other respect, worked as kindly, and made as good sugar, and as quick, and in as great quantity per acre, as any that had been cut during the rolling or crop-gathering season. This satisfied us at once that the measure was a discovery equalled only in importance to Louisiana by the introduction of sugar cane itself.

James McCalop, Esq. of the parish of West Baton Rouge, converted the Poplar Grove estate into a sugar farm, and gathered his first sugar crop during the winter of 1829—30. On the 18th of November there was a severe frost, which froze the cane. Mr. McCalop being a new sugar planter, consulted with his sugar growing friends on the expediency of wind-rowing his cane, who all told him, if we remember correctly, that he would ruin his crop. The opinion of his sugar maker was then asked, who replied that he would not take upon himself the responsibility of recommending the measure. What, then, was to be done? Many hundred acres of cane were completely frozen, and according to all probability if it stood in the field, none of it would yield sugar at the end of three or four weeks. Persons who have established sugar estates know something of the cost attendant upon doing so. This was Mr. McCalop's first crop, and the prospect of its almost entire loss, was not calculated to increase the equanimity of his reflections. Under these circumstances, and with a knowledge of the result of the experiment made by Mr. Anderson, he determined to put all his cane in wind-rows, following the plan of the Mount Hommas experiment, and accordingly did so, leaving standing only about three weeks grinding; at the end of which time it would make neither sugar nor molasses—not even vinegar. He then began upon the cane in wind-rows, and found it in good order, and continued making good sugar till the 9th of February—making as good sugar at that time as he had made at the commencement, or at any other time of the season. By way of testing the experiment more fully, Mr. McCalop left five or six rows of cane standing, which at a time long before he was done making sugar, was completely rotten, and entirely useless. In this case, the experiment succeeded beyond the most sanguine expectations of Mr. McCalop. We recollect hearing it stated at the time, that he made a better crop than any person on the coast. We know several persons who pursued the plan in their crops of 1830—31, and since—the number increasing every year; and we have yet to hear the first one say that the plan did not succeed well.

John Nolan, Esq. of the parish of West Baton Rouge, remarked to us a few days since, that he would not for ten thousand dollars, agree to never wind-row his cane, for that he saw no other way to save his crop when an early frost, which frequently occurs, froze his cane to the ground, almost by the time he could begin to gather it. The idea that the cane must be severely touched with the frost before it is laid down, is, Mr. Nolan thinks, fallacious, and for the following reason. Before he commenced grinding, and before cane leaves were deadened by the frost, he cut a road through the cane, which was laid in a wind-row, and ground towards the latter part of the gathering season, and was found not to be sprouted, but made as much and as good sugar as any that was laid down after the vegetation was destroyed, or after the cane was frozen.

After all this, with a knowledge of the fact that such is the variability of our climate—a difference of sixty degrees Fahr. often occurring in the winter months, during a single week—that the cane which is one day frozen, may the next be thawed, and be on the third, good for nothing; is

it not surprising that there are persons, sugar planters too, who are still skeptical on the subject of wind-rowing the sugar cane, as soon as the leaves and upper joints are deadened by the frost?

From the Southern Agriculturist.

ON THE ROT IN COTTON, AND THE INTRODUCTION OF THE PETIT GULF SEED FROM NEW ORLEANS AS A REMEDY.

Edgefield District, (S. C.) near Mount }
Vintage P. O. December 14th, 1834. }

Sir—I shall endeavor to throw some light on the rot in cotton, and recommend the more general introduction of a better species, than our common green seed.

The last year I purchased in Augusta a bag, containing about six bushels of what is termed Petit Gulf Cotton Seed, and with it planted about ten acres of land; this cotton did not suffer from rot, whilst a fourth, at least, of the balance of my other cotton crop was lost by it. With the seed produced from these ten acres of cotton, I planted seventy acres the present year, and had enough left to replant a supply if occasion should have required it.

The general and fatal effects of the rot the present year, is so well known, that it is unnecessary to enter into a detailed account of it. My cotton was so much exempt from it, that I thought it unnecessary to make any calculation of loss from it, whilst that of my neighbors all around was destroyed in a ratio of from one-fourth to a third of their crops; and although the frost of the 20th October, was so severe as to destroy all vegetation, my cotton crop will show five thousand weight of seed cotton picked in, to every effective hand, and in this section of impoverished country, may be considered a good crop, even if no accident had occurred; and this I ascribe to the Petit Gulf seed. I would, therefore, advise every planter of cotton, to procure this seed from New Orleans, let it cost what it will, at least as much as will put him in seed for the next year, and to adopt the same plan every second or third year at farthest, for after that period it will become degenerated by mixture, and then more subject to the evil of which we complain. Perhaps by the general introduction of this seed the enemy may, by the change of food, be driven off entirely, as I am perfectly satisfied, that the rot originates from insects, and we know that every insect has a predilection for a certain kind of food, and this species of cotton is less palatable to them than the common green seed. I am the more convinced of this fact, from having tried a small experiment two years in succession, of some black seed from Peru, to acclimatize it, but found the seasons too short, to make it an object. This cotton was not affected by the rot, whilst other cotton near it was—and if I am not mistaken, the sea island cotton is exempt from this kind of rot.

On a former occasion I have advanced this opinion in relation to insects, and every day's experience confirms me in it. These insects are like some of the human family, a kind of thieving tribe that seldom appear until the sun declines and "the evening shades" prevail, and then come from

their concealments to commit their depredations, until he returns to throw his light upon the earth, when they retire to their covers beyond discovery.

The reason why the cotton bolls are more subject to the rot in rainy seasons, or when the atmosphere is humid, is owing to a promotion of growth in the plant, making them more tender and susceptible of perforation than in dry seasons, rendering the insect more industrious in taking his food, and leaving the injury behind him. It is always observed after a shower of rain, that insects are more upon the alert in gathering food, and sipping from the breath of Flora the refreshment produced by it, than in a time of drought.

In conclusion, I would further remark, the Petit Gulf cotton, grows more luxuriantly, the quality is better and one-third more can be picked out in the same time than the green seed; and the return is thirty pounds of nett cotton to one hundred of that in seed.

A PRACTICAL PLANTER.

WHEAT INSECT.

The following description of this insect by Prof. Low, agrees with our observation of it about Albany.—*Con. Cult.*

"Certain flies also attack the wheat, at a later stage of its growth. The *Cecidomyia Tritici* is a fly with an orange colored body and white wings. About the month of June the female ascends the ears of wheat, and deposits her eggs in these by means of a fine trunk, and in a few days she perishes. The progeny being hatched in the ear, feed upon the grain. They are very small, from ten to fourteen being sometimes found in one grain, and are distinguished by being of a bright orange color. They do not extend beyond the grain in which they are born; but several grains being thus consumed on one ear, the damage done is often considerable. The larvæ, after a period, fall down to the earth in which they burrow, and remain there till the following summer, when they ascend from the earth in the form of the beautiful fly which has been mentioned."

For the Farmers' Register.

ADDRESS DELIVERED TO THE AGRICULTURAL SOCIETY OF ROCKBRIDGE, BY THE PRESIDENT, DR. R. R. BARTON.

Gentlemen.—The duty of addressing you on this occasion has again been assigned to me, and though I may have wished this to have devolved on other hands, I will cheerfully comply.

I would have been glad to have gone into a review of the operations of our society since our last meeting at Fancy Hill, and have presented a synopsis of our proceedings since that time. But I regret to say, the materials would not afford me much to dwell on. We are yet in a state of infancy, and have not entirely overcome the prejudice against innovation and *book knowledge*. Much, however, has been done to arouse our farmers from their lethargy, and excite emulation and a spirit of inquiry. Your premium for the corn crop was awarded to Capt. Barclay, for the pro-

duce of nearly 64 bushels per acre. As this was on upland, and on a stiff clay soil, the product is creditable, both to his skill and industry; and I regret I have not yet been furnished with his mode of cultivation. And I would here suggest, that this duty should be rigidly enforced hereafter, in every instance, before the premium is awarded. On the wheat crop, there has yet been no formal report; but I have been informed, that a member of this society has averaged about 25* bushels per acre, on a field of 18 or 20 acres; and a very successful wheat grower on Buffalo, informed me, he had selected 4 contiguous acres in a field of 40 acres, not very superior to the balance, and after careful measurement, found the 4 selected had averaged 34 bushels to the acre. Here then, in all probability, was an average of not less than 30 bushels per acre, on a 40 acre field. This was a clover lay, and will account for its superiority over other fields in the same neighborhood.

These products, though much less than our soil is capable of, induce me to hope our society has at least commenced the work of reform, and by the stimulus of premiums, and the honor conferred on the successful competitors, is about to awaken farmers to the capabilities of their soil, and their true interest. Such has been the effect of these associations elsewhere, and every where they have been established. Some, it is true, have languished for a few years, and ceased to exist; but this has generally proceeded from their efficient leaders being cut off by death, before they were finally under weigh. But even in these instances, we see their very organization infuse life and animation, and that zeal so necessary to farming, as well as every other avocation; and whilst they taught the farmer his individual interest, and the obligations he owed the community, inspired him with increased love for his country and his home. In Frederick and Albemarle, we know the happiest effects have resulted merely from these societies being organized, and much valuable and interesting matter to the farmer, has been elicited in both quarters. The emulation and zeal excited by these associations are, too, not confined to their immediate members. Those who, from the prejudices growing out of ignorance, from petty jealousies, or from whatever cause, hold themselves aloof and refuse to join us, are still materially benefitted. They feel ambitious to show us, that though not members of an agricultural society, they can successfully compete with us. And as all such associations are formed for the noble purpose of diffusing knowledge and doing public good, they care not in what way this is effected—whether by the mere spirit of rivalry, or by the more commendable motive of pointing out to farmers the errors of their present system, and calling their attention to the agricultural improvements made elsewhere: for there is probably no knowledge which travels with so slow a pace. Important improvements may exist within fifty miles of us, which would require as many years to reach the great mass of farmers, unaided by agricultural societies, and periodicals devoted to the science of agriculture. Two of the most distinguished and successful agriculturists of New York, Judge Buel and Mr. Stimson, have borne ample testimony of the great

utility of such societies properly conducted. The former says, "they have effected more for the state than any other set of causes, whatever." And Stimson says, "the farmers have much improved their farms in this town, since our State Agricultural Society was organized, and, of course, their crops have increased in proportion." He further remarks, "he has no doubt that the money which was appropriated by the state to encourage agriculture, has increased the wealth of the county in which he resided, more than 20 per cent. a year since." I will not, however, encroach on your patience, by adducing any other evidence of the effective aid these societies have rendered, and are capable of rendering the cause so dear to us all. A little reflection will make it evident to all; and if the prosperity of every calling and profession, be dependent on that of agriculture, and this cannot be denied, let us unite in a more determined effort, to fulfil the objects for which this society was instituted, and to render it at least as useful as some of its kindred societies of the North.

But, gentlemen, I would call your attention to what I conceive the radical defect in our system—the total neglect of *agricultural education*! Is it not strange, that though the prosperity of all is so dependent on us, this should be entirely neglected? And I assert, without hesitation, that none of the *learned professions*, as they are called in common parlance, require such a range of knowledge as ours. All the sciences are subservient to it, and if not absolutely necessary to the pursuit of agriculture, render it essential aid. But so great is the prevailing error on this subject, that all our youth, esteemed the most promising, because the most pert and precocious, are destined to expound the law to us—to dose us with physic—or to teach us our duty to God and man. This will account for the increase of pettifoggers, charlatans, fanatics, and I may add, of mere clod-hoppers. I mean no disrespect to either of the professions. To one I am decidedly partial, and my best friends are divided amongst them all, and all are necessary, and entitled to our esteem. I complain there is a redundancy in all—a competition carried to an extent, not only injurious to themselves, but really to the whole community. I entreat you then, gentlemen of this society, to commence the work of reform—spare no pains towards educating your sons as farmers, and after they have acquired a thorough knowledge of the sciences, lop off an hundred acres of your farms to each, and let them shift for themselves. But to give a taste and fondness for rural life, I would propose the establishment of colleges on the manual labor system, or, pattern or experimental farms, where they might receive the instruction of the most able professors in every department, and at the same time have their *physical* powers improved, by devoting a certain number of hours of each day, to the various occupations of agriculture. It is much to be lamented, that we so often see the most delicate and feeble of our youth, encouraged in the most severe and sedentary course of studies; because they are condemned to one of the *learned professions*: and instead of entering on the duties of life with a *sound body*, as well as cultivated mind, the former is so enfeebled for the want of its due share of exercise, as soon to be worn out by mental excitement, and sink into a premature grave. On the plan I would propose, all the phy-

* Since ascertained to be 33 bushels per acre.

sical energies would be brought into action and improved, whilst two-thirds of their time would be devoted to the improvement of the mind alone. But much of the theory taught at such establishments, might, during the hours of labor, be reduced to practice, and thus one made subservient to the other. This plan, it appears to me, possesses decided advantages over that of the Gymnasia, of some of the German schools. It may be asked how are such institutions to be supported? And I would reply, as our present schools and colleges. And if in no other way, by legislative aid. Many of these, however, would derive considerable aid from the labor of their pupils, if judiciously directed; and those, whose parents were too indigent to assist, would expect to devote a larger proportion of their time to manual labor. And for this they would be amply rewarded, by the acquirement of their professions in a few years; and thus be enabled to take their stations at once in society, as scientific and practical farmers.

When we reflect that about nine-tenths of the whole community are engaged in agricultural pursuits, we will at once see the great moral influence we are capable of exerting. And it is our own faults if we are the "hewers of wood and drawers of water" for every other class. If not prepared by education, we do not deserve to share the loaves and fishes. I am anxious, then, to convince you, that by preparing your sons as they should be for an agricultural life, you at the same time qualify them to fill all and every station, with honor to themselves and their country. If they are ambitious of preferment, and their inclinations should tempt them to leave the peaceful and happy walks of agriculture, to embark on the polluted and stormy sea of politics, they have an equal, if not better chance, of attaining office, and this bubble distinction, than the youth of either the other professions. Of this, history affords many examples; and if the acquisition of wealth is desirable, they still have an equal chance: and numerous instances might be cited in our own country, as well as abroad, of men engaged in agriculture, and commencing, too, with little or no capital, acquiring large estates.

The time consumed with these remarks, has not been misspent, gentlemen, if I have convinced you, or your sons, that our profession is the happiest, and offers equal prospects for wealth, honor, and distinction. For myself, I am ambitious of no office, not even that which I now have the honor to hold; and my sole object is to aid in placing our profession along-side the *learned ones*, if not to occupy the foremost rank.

When I before addressed this society, I called their attention to lime as one of our most valuable manures; and its importance will justify a few more remarks. No soil can be deemed valuable that does not contain a portion of this earth, either in a state of nature, or combined by art. This is usually in the shape of carbonate, throughout our lime stone districts. But even here, Mr. Ruffin in his work on calcareous manures, has shown there is a deficiency of calcareous matter or carbonate of lime. And I would beg leave to refer you to his analysis on this subject. An error too frequently prevails amongst us, that stable manure will supply the wants of any soil, and correct its barrenness. This arises from a want of chemical knowledge—for whatever be the quantity of this

kind of manure applied to a soil containing the sulphate of iron, its sterility will not be removed. Yet a small quantity of lime will soon render it fertile and productive. This, then, as an important fertilizer, should not be neglected; and much of our spare time in the winter season should be devoted to preparing it.

I would again call your attention, too, to a most important subject; that, of the *best rotation to be pursued*. The four-shift system has been recommended on high authority—and even the three-shift has been advised: but either is too exhausting. Dawson, an able English agriculturist, remarks in Loudon's *Encyclopedia of Agriculture*, "that the four-shift husbandry is only proper for *very rich land*, or in situations where there is a full command of manure. That by far the greatest part of the land in England, requires to be continued in grass two, three, four, or more years, according to its natural poverty; that the objection made to this, viz. that the coarse grasses in a few years usurp possession of the soil, must be owing to the surface soil not being sufficiently mixed with lime; the lime having been covered too deep with the plough." Here, too, we may derive a useful hint in the use of lime, on our soils infested with weeds and the coarser grasses. It seems then this system is objectionable, unless the land is *very rich*, or there is a *full command of manure*; and if we have to depend on artificial means, it will be necessary to manure *one-fourth* our farms annually. This not only requires a vast expenditure of labor, but none of us have such a command of manure; unless indeed, we had a considerable capital to expend in burning and hauling out lime. But to the farmer, time is money, and so is labor—and whilst labor is so high, and capital so scarce amongst us, we must seek the improvement of our lands, and the consequent increase of our products, by a less costly and operose system, than the four-shift. It is true, many of us might by this rotation greatly increase our annual products for a few years; but eventually, our lands would be exhausted, and our posterity would only inherit worn-out and steril farms. A few of us perhaps, might say, we will leave posterity to take care of themselves—but I hope this number is but few. If there are any such, let us pity them, whilst they fold their arms in their own selfishness—they belong not to the great mass of the agricultural community, who I am proud to say, are excelled by none in patriotism, and a proper regard to the comfort and wants of their posterity.

From the Baltimore Patriot.

THE PORK BUSINESS AT CINCINNATI.

Cincinnati is the greatest pork market, in the known world. The number of hogs slaughtered annually, and the perfection and science to which the art of "hog-killing" has been brought, is indeed astonishing. The business of *butchering*, is carried on distinct from that of *packing*, and by different persons. The most extensive establishment of the kind, is the one on Deer Creek, owned and conducted by Mr. John W. Coleman. At this place, last year, 100,864 hogs were slaughtered. There are four houses situated at different points on the ground occupied, which is a lot of eight acres—the ground is divided into pens some

40 or 50 in number, where the hogs of each owner are put by themselves preparatory to the massacre. About 40 men are employed in each house, and each has his separate and allotted duty to perform, and receive on an average about \$1 25 per day. Each house has two scalding tubs, one at each end, so that the work of 'death and destruction' goes on *double* in each building. At each end of the house is a small pen, into which they crowd 40 or 50 hogs, or as many as can possibly be got in—then walks in on their backs, the dark and bloody executioner, holding in his hand a large sledge hammer, with which he 'deals death' to the unoffending victims—after which they are dragged inside the house, a knife passed into the throat, and after bleeding a few seconds, thrown into a kettle of hot water, from thence to a block, where the bristles are scraped off with iron scrapers, made expressly for the purpose—then strung up by their hind feet and dressed—thence removed to another room, where they remain 'to cool' until morning, and then taken on wagons to the packing houses. It is but a little over *one minute from the time the executioner enters the pen and knocks the hog down, till he is strung up and dressed.* The bleeding, scalding, scraping, stringing up, and inside dressing, is *all* accomplished in about a minute. This will be thought marvellous, but it is no more strange than true. I have frequently witnessed with astonishment the operation. At one of Mr. Coleman's slaughter-houses, he has a man that opens, removes the offal, and completes the dressing of *three hogs in a minute*—to this man (who is a sort of king among the hog-killers) he pays two dollars and fifty cents per day.

They can slaughter at each of the houses, and have them completely dressed and strung up, (preparatory to removal in the morning to the packing houses,) *six hundred and fifty in a day*, which is altogether, at this one establishment, *twenty-six hundred*—and this done from day light in the morning till dark, say at this time, about *eleven hours*, allowing thirty minutes for dinner. Mr. Coleman informed me, that he has already killed this fall between 50 and 60 thousand, and has been at work but three or four weeks; the only pay he receives is the offal, consisting of rough fat, soap grease and bristles; this is generally worth, nett 20 to 25 cents each hog. It is supposed he cleared at this business last season (and the season lasts but about three months) some 15 or 20,000 dollars. The whole number of hogs killed last year, in the city and vicinity, is ascertained to be a little rising *one hundred and twenty-three thousand*. Deer Creek is a stream running into the Ohio river on the eastern suburb of the city; about half a mile up this stream, these slaughter-houses of Mr. Coleman are situated, and during the whole 'hog season,' this stream, from the houses to the river, is running blood, and generally goes by the name of 'bloody river.'

Others are engaged in the slaughtering business, but not on so large a scale as Mr. Coleman, who is, what Yankees call, a 'smart' man.

From the slaughter houses, the hogs are conveyed in large wagons, that hold from 25 to 40, to the various packing houses, which are situated in almost every part of the city, and there weighed, cut up, packed, &c. The purchasers pay for

them as per the weight, after being dressed. These packing houses are upon the most extensive scale. The capital employed every year in the 'hog business,' is immense, probably about *two millions of dollars*. One of the most extensive packing houses in the city, is owned and conducted by Miller & Lee; their building is of brick, three stories high, 120 feet long, 60 wide, with out-buildings, sheds, &c. that cover for aught I know, an acre of ground. These men, who are very enterprising, have a high reputation for the uniform excellence of their pork, as also for their superior hams; their '*sugar-hams*' are said to be as good as any cured in any part of the union. There are other 'pork houses' equally large, and on as extensive scale. At one of these they can pack and have ready for shipment *two hundred and fifty barrels of pork in one day*, and I am informed, upon a pinch, *three hundred barrels* could be turned out, and that with *thirty men in about fourteen or fifteen hours*. It is, indeed, astonishing, the rapidity with which they put a hog out of sight, when they once get fair hold of him. As at the slaughter houses, a perfect system is kept up, every man has his allotted duty to perform, and there is consequently no interference with each other; every thing goes on 'like clock work;' when the hogs are received, they are first weighed, by the weigher, then passed to the "blocking men," who place them on the several blocks, (two are generally used) when they are received by the "cutters," and are very quickly despatched; the various qualities separated and thrown into their respective places. One man weighs for the barrels, (200 pounds,) and throws the meat into the "*salt box*," from which the "*packer*" receives it, and when the barrel is packed is turned over to the "cooper," who heads it; it is then bored, filled with a strong brine, plugged, branded, and ready for shipment. Fifty pounds of Turks Island, or other coarse salt, is allowed to each barrel of pork.

The lard is cut into small pieces before going into the kettles; the leaf lard goes into one kettle, and the rough lard into another; there are generally eight or ten men employed in the lard department, when an average of *two hundred kegs, or about nine thousand pounds are turned out daily*.

A large quantity of "bulk meat," is generally produced, this is from small hogs, too light for prime pork. The hams are smoked and generally canvassed before shipping. They are, however, very unlike a lot of Kentucky canvassed hams, sold a few years since at Port Gibson, which on examination, after the seller had gone, were found to be of *wood*, instead of "hog meat." Better hams cannot be procured than those smoked in Cincinnati. The hams cured by Miller & Lee, W. Hartshorne, W. M. Walker, William Irwin, and in fact, by all our "pork makers," can rarely be equalled in quality. Technical names are used in pork houses as well as in most branches of business. The following are a few of them: *blockers up—cutters—briners—kettle tenders—choppers—lard trimmers—ham trimmers—bulkers—lard drawers—packers—coopers—weighers—&c.*

I am informed, the largest quantity of pork packed last year, by one house, was Burdell and Davis, for the Messrs. Winchesters of Boston, the number of barrels being between five and 6000. No one establishment will pack as much this year. Many of our merchants are engaged

largely in the packing business, at various points in the vicinity of the city—at Rossville, Hamilton, Middletown, Lawrenceburgh, &c. It is estimated that the quantity of pork exported last year, from Cincinnati, which includes that packed in the above towns, fell very little short of 45,000 barrels, about 85,000 kegs of lard, 270,000 hams, besides shoulders, sides, bulk meat, &c. One of our enterprising citizens alone purchased, I am told, last year, 35,000 kegs of lard, and fortunately it proved a profitable investment. There are altogether in the city, about 26 or 27 pork houses, and they now employ about 10 to 1200 men, at an average of a dollar per day. At the commencement of the season hogs appeared plenty, and were purchased at a fraction lower than last year, say three dollars per hundred for those averaging 280 pounds. I am informed that they are now becoming more scarce, and that the price is advancing. There will not be so many packed this year as last. Some that were engaged in it last year, lost more or less money, owing to the distress in the country, and the impossibility of effecting sales at fair prices; so that there are, probably, not as many engaged in the business as formerly. Money now being more plenty than last year, and a general demand existing for the article, ready sales at fair prices will be made. The demand now in this market for pork and lard is good, and a gradual advance in price has and will continue to take place. Most of our pork packers are men of wealth, and can consequently "hold on," there will be no necessity of forcing sales. However, they cannot pack enough before the season closes to supply the demand, which is much increased by many of the army contractors being in the market, and wishing to purchase to fill their contracts."

From the Florida Herald.

FLORIDA COFFEE.

MR. EDITOR,—I have brought under cultivation a species of coffee which grows wild in Cuba, and has found its way to the city of St. Augustine, supposed to have been brought there many years since by the Spanish people. It is completely naturalized to our climate, and will grow in any of the cotton growing states. I recommend the cultivation of it particularly to the planters as another staple of immense value, which will realize more than any other staple of our country now under cultivation, even if we obtain not more than half the price of West India coffee. It is made use of in the interior of Cuba, by the inhabitants as coffee. It also grows wild on the banks of the Mississippi, around New Orleans, where it is collected by the French people and made use of as coffee.

I have made use of it in my family for three months, and find it superior to the green Cuba coffee. It improves from age; being equal to the best of coffee in three months after it is collected. Those who are peculiarly fond of the taste of the green Cuba coffee, can obtain it by mixing at the rate of one pound of the green Cuba coffee with four pounds of Florida coffee.

It is an annual plant and must be cultivated in the same manner as cotton, leaving the plants at a greater distance, as it grows most luxuriantly

from ten to twelve feet high on good land. It will grow on the poorest land which has been exhausted from cultivation, and will produce a good crop. Plant it at the same time that cotton is planted, on beds five feet apart. On good land plant your seeds five feet apart dropping ten or twelve seeds; cover it lightly when the plants are sufficiently grown, thin them out, leaving a single plant at the distance of five feet: poor lands may be planted nearer; two pounds of seeds will plant an acre of land; one acre will produce from fifteen hundred to two thousand pounds of coffee; it blooms from early in July until late in October, ripens from early in August until frost, or early in November; the seeds are about the size of a grain of wheat, of an olive color, each pod containing from forty to sixty grains of coffee. The pods must be collected as fast as they ripen, and when thrashed, which is performed with a common stick from the woods, it must be done in a close room with a tight floor, and after it is winnowed it is then fit for use; neither horses, cattle or hogs will eat of the plant; it is not disturbed by caterpillars or any insects; it returns more foliage to the land than any highland cultivation; it is also a great acquisition to the rearing of bees as pure honey rises on the stem of each stalk of the leaves, which is sought after by the bees and ants.

The Editor of the Southern Agriculturist, and all Editors in the cotton growing states will please insert the above for the public benefit.

I am yours respectfully, &c.

ABRAHAM DUPONT.

Mantanzas, East Florida, Nov. 25th, 1834.

Seeds may be obtained by applying to Messrs. J. & C. Lawton, Charleston, S. C.; and of Col. Francis Gue, of St. Augustine, E. F.

The following extract answers queries which first appeared in the Farmers' Register, (page 8, Vol. II.)

From the Southern Planter

USEFUL HINTS.

Early County, (Ga.) Nov. 18th, 1834.

Dr. Bartlett—I see a request in Vol. 2 No. 25, entitled "Odds and Ends" by J. K. desiring to know a sure remedy for destroying nits and lice on hogs, &c. Take the oil of bays and spread it on a piece of leather and rub it well upon the animal, and I warrant that it will kill them speedily. What is the best remedy for worms in horses? Take nux vomica and rasp it down, say one button, and mix it with a little meal and give it to the horse. To destroy house flies take nux vomica rasp it up and pour water to it and steep white cloths and hang them up, and that will destroy flies. To prevent the ravages of the fly that eats tobacco plants, take oak bark and make a fire after sun down to the lee of the bed so the smoke may not go among the plants, or take corn meal bran and scatter it over the bed. Whether the bran collects birds that destroy the fly, or whether it collects ants, or whether they prey upon the bran themselves, I cannot determine.

Yours, AARON GOOLSBEE.

Extracts from the last edition of the "Complete Grazier."
ON THE ECONOMY AND MANAGEMENT OF
THE DAIRY.

Of milch kine.

The value of the respective breeds of milch kine having been already stated,* it will rest with the farmer to make his selection, according to the nature of the soil in his occupation, and of the particular branch of dairying which he means to pursue: for if his object be to sell the milk, or to suckle calves, quantity must be the material consideration; and quality, if he mean to produce butter and cheese.

It is a general observation, that the richest milk is produced by the red cow, while the black sort is reckoned best for the purpose of breeding, as her calf is usually both stronger and more healthy than the offspring of the red species. This, however, is one of those errors which have been transmitted, through a long series of years, without being founded on fact. The red cows have, indeed, been long celebrated for the excellence of their milk; and the calves of black cows have been proverbially deemed good: but color in this respect is a matter of no moment; the breed alone should claim the farmer's attention. But cows even of the same, and of the best breeds, will not always yield the same quantity of milk; and of those which yield the most, it is not unfrequently deficient in richness. Trials, are, however, easily made, by keeping the cows on the same food, weighing the quantity consumed by each, and measuring their milk; then keeping and churning it, a few times, separately: thus, reckoning the cost of the provender, and the produce of the milk of each, and comparing the result, it will be soon discovered which is the most profitable animal. Comparisons of this kind are not often made; for farmers usually purchase whatever stock they can most conveniently, or most cheaply, lay their hands on; and are then content to keep them so long as they turn out tolerably well. This, however, is the height of bad economy; for an indifferent cow will eat as much and require as much attendance, as the best; and thus occasions a daily loss, that will soon exceed any probable saving in the original price; whereas the man who takes the pains to acquire a good stock, and has the sense to keep it, lays the sure foundation of a fortune.

In point of quantity, large cows, of whatever breed, will generally be found to have the advantage over the small ones. In this particular, the Tees-water breed excels; but they require a rich soil, and if the land be not of the best kind, a Suffolk, or a Scotch cow, will be preferable. It is common for cows of the first mentioned breed to give as much milk as thirty quarts a day; and there are instances of even more; but they are of the old Yorkshire stock, and do not belong to the improved breeds of short horns, and their milk is not considered equal in richness to the Devon or the kyloe.

In order to ascertain their comparative merit, two experiments are recorded to have been made in the county of Durham, by different persons of impartiality and experience, who each got two

ounces of butter from a quart of kyloe milk; while a quart from the short horned breed produced, in one instance, only one ounce, and in the other but very little more. From a further experiment on six cows of the short horned improved breed, it however appears, that the product of a quart of milk from each was as follows:—

No.	oz.	dr.
1	3	0
2	1	6
3	1	12
4	1	10
5	1	14
6	1	6

The great difference between No. 1, and the remainder, is accounted for by the age of the former being six years, and that of all the others only two; for the produce of butter increases up to a certain age, and cows are most productive from four to seven years old. The result of other trials of the value of the milk of the two breeds, varied, but the quantity was uniformly in favor of the Yorkshire.*

In other counties the results have been stated thus:—in Devonshire, according to Mr. Vauconver, three gallons of milk give 20 oz. of butter; Mr. Wedge says, that, in Cheshire, one gallon yields 16 oz.; Mr. Wakefield states the Lancashire return at four and a half pounds from about sixteen gallons, in one instance, and in another, at eight pounds from the same quantity; and Mr. Aiton calculates the average, in Ayrshire, at six oz. per gallon, though that is frequently exceeded in particular instances.

The same gentlemen state the average quantity of milk produced by dairy cows, until dry, in those several counties as follows:—in Devonshire, *twelve*—Cheshire, *eight*—Lancashire, *six*—and Ayrshire eight quarts, per day. Mr. Aiton, however, rates the produce of the best Scotch cows much higher, and estimates their yearly produce, thus:—

Days.	Gallons per day.	Gallons.
1st 50	6	300
2nd 50	5	250
3d 50	3½	175
4th 50	2	100
5th 50	2	100
6th 50	1½	75
300 average per day 13½ quarts;		1000

Many instances of superior productiveness are cited in the county reports, and other publications, which it would be tedious to enumerate; but one of those is too curious to be omitted. It is that of a cow belonging to W. Cramp of Lewes, in Sussex, which, during four successive years, afforded the following produce; viz.

	Quarts of milk.	Pounds of butter.	Profit.
1805	9421	541	£41 5 11
1806	4137	450	30 16 1
1807	5782	675	51 13 1
1808	4219	466	29 19 7

Thus leaving a nett profit of £153 14 8

After deducting the expense of feeding; but the

* See No. 4, Farmers' Register.
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* Agricultural Survey of Durham, p. 227.

charges of management are not included, and dairy produce was then high.

In one superior Epping dairy, where much attention had been paid to the selection of the stock, the North Devon breed is considered superior to both the short horned and the Leicester for the richness of the milk, though the quantity is one fourth less; they bear hard living better in the winter, and their calves are found to excel others both in the disposition to fatten, and in the color and quality of the meat.*

It will, however, be generally found, that, supposing the food to be the same, those cows which yield least in quantity, have the richest milk. Yet both quantity and quality constantly vary, even in individuals of the same breed, age, and appearance, and are always affected by the mode of feeding. When kept on old meadow, the butter will have a better flavor than when the cows are fed on artificial grasses, or even on land that has been newly laid down to pasture, and although grains, cabbages, turnips, and other succulent roots will increase the quantity of the milk, yet hay and corn will add most to its richness. Lean cows never yield either so much, or so good milk, as those which, without being actually fat, are kept in proper condition; and all gradually fall off in quantity after calving, until they become dry.

Whatever breed may be selected, there is still a material distinction to be observed between the form of a cow intended for the dairy, and that of one intended for fattening. While the latter should possess, as nearly as possible, all the most remarkable points, already described, of the best oxen, the milch cow should, on the contrary, be thin and hollow in the neck; narrow in the breast and point of the shoulder, and altogether light in the fore-quarter; with little dewlap, and neither full-fleshed along the chine, nor showing, in any part, much indication of a disposition to put on fat. The hide should be thin, the hair fine, and the tail small. But, especially, the udder should be full and round, yet thin to the touch, and should be of equal size and substance throughout. If it shows more behind than before, it is deemed a sign of the milk falling off soon after calving; and if it feels coarse and lumpy, the bag will be found not to contain a large quantity. The teats should stand square, at equal distances, and should neither be very large, nor very thick towards the udder, but nearly equal, yet ending in a point. Another very material consideration is the temper; for kindly cows will not only give less trouble than those of an opposite disposition, but they are generally remarked to possess a greater quantity of milk; and, from parting with it more readily, they are less subject to fall off in their milking.

Of the pasture and other food best calculated for cows, as it regards their milk.

As the nature of the grass, or other vegetables, has a very considerable influence on both the quality and the quantity of milk which cows produce, the attention of the industrious farmer will, of course, be directed to this point; for, as instances have occurred, where six milch kine, fed on some pastures, have yielded as much milk as nine, or

even a dozen will afford on inferior ground, it is obviously his interest to have his cows well fed, rather than to keep up a particular number, without heeding whether they are properly supplied or not. Hence, it will be proper to suit the milch cows to the nature and fertility of the soil; and on no account to purchase them from pastures superior to those destined for their reception.

The feeding of milch kine is divided into two branches, viz. *pasturing* and *house-feeding*.

In order to obtain an abundant supply of good milk, where the pasturing of cows is adopted, it is not alone requisite that the grass be plentifully produced, but also that it be of that quality which is relished by the cattle; and this property will generally be found in some old natural pastures that have been properly managed. Much attention, however, is necessary, in order to eradicate the crow-garlic, or garlic-hedge-mustard, and similar weeds, which, when eaten by cows, uniformly impart a rank flavor to their milk, and consequently to the butter which is made from it. It is likewise worthy of note, that though the long, rank grass, growing in orchards or other places, in general feeds well, and produces a flush of milk, yet such milk will neither be so rich, nor carry so much cream in proportion, as the milk of those cows which are fed upon short fine grass; nor, of course, will their butter be so good.

The quality and quantity of milk is materially affected by driving them to a distance from one pasture to another; hence it will be proper to have the cow-sheds in as central a part of the farm as possible. It is also of essential importance to have pastures well sheltered and inclosed, as the produce of milch kine will be greatly improved, or deteriorated, according to the attention or disregard bestowed on this point; for, when confined within proper enclosures, they not only feed more leisurely, and are better protected against bad weather, but are also less liable to disturbance than when they wander into other fields; and both moderate warmth and quiet are mainly conducive to an increase of milk.

With regard to the housing of milch kine during summer, the general practice is, where there are proper enclosures, to send them out in the evening, in order that they may lie out during the night, while, during the day, they are kept more cool and quiet in the cow-sheds than in the fields. The advantages thence resulting are, that they breathe a purer atmosphere, and there can be but little doubt that, at that season, they yield more and better milk than if they were wholly confined.

Indeed, in some of even the most exposed situations in the west of Scotland, the cows are turned into the fields every day throughout the year, unless in the most stormy weather, and some persons even keep them constantly out, both day and night. Although we cannot recommend the latter practice, yet it is certain, that animals thus treated are much more hardy, and less exposed to injury from sudden changes of the weather, than when they are kept warm. They are also said to yield more milk; in proof of which assertion is the common observation, that when cows, accustomed to lie out, have been housed at night, they have been found more dried up in their milk on the following morning, than others that had even been exposed to a storm.

In the winter, however, milch kine are usually

* Agricultural Survey of Essex, Vol. II. pp. 281, 290, &c.

fed in houses; and, where the practice of keeping them in stalls, does not prevail, it will be proper to have warm sheltered yards, furnished with open sheds, in which they can feed without exposure to the severities of the weather. The latter is the preferable practice; for pure air is indispensable to health; but if stalls are used, the cow-houses should be well ventilated, and situated rather adjoining a pasture, or a yard into which the cows should be frequently turned.

In the management of milch kine, it is essential that they be, at all times, kept in high health and good condition; for, if they are suffered to fall in flesh during the winter, it will be impossible to expect an abundant supply of milk by bringing them into high condition in the summer. Hence, if cows are lean when calving, no subsequent management can bring them to yield, for that season, any thing like the quantity they would have furnished in case they had been well kept throughout the winter. Farmers cannot indeed be easily persuaded to afford high feeding to unproductive stock; nor is that requisite for cows that are dry; but the common practice of keeping them during that period, on straw alone, or on the worst hay, is very improvident, and the injury to the future produce of the cow, will be more than equal to the saving in provender. During that inclement season, therefore, some nutritious food should be provided for them, and the animals be kept moderately warm; for beasts will thrive more and yet not eat so much when kept warm, as when they are shivering with cold. When fed on straw, or coarse hay alone, without any green food, till towards the time of calving, their milk vessels become dried up, and they will not afterwards yield either much milk, or of good quality, until they are turned out to pasture. The milk of lean cows is always thin, and as deficient in quantity as nutriment; it is therefore important that milch kine should be maintained, at all times, not only in good condition, but in what may be termed a *milky habit*. For this purpose, a small quantity of any of the succulent roots will be found sufficient in addition to their usual dry food: even a very few Swedish turnips in a day will be found essentially useful in preventing costiveness, binding of the hide, and the drying up of the juices; and will be conducive, not only to the present health of the animal, but to her preservation in that state of body in which she will be most fit to profit by the superior nourishment to be obtained in the spring.

In Holland, where it is well known that the management of cows is carried to the highest perfection, they are curried in the same manner, and kept as cleanly, as horses in a stable.* Such, indeed, is the attention paid to cleanliness, that it is by no means unusual to see cows, when housed, kept with their tails suspended, in the same manner as that of horses after they have been nicked, in order to prevent them from being soiled with the dung. This, perhaps, is carrying the minutiae of neatness rather far, but if an error, it is at least one on the right side, and the invariable high condition of all Dutch dairy stock is the surest proof of their superior management; the chief features of which are—care in keeping them dry as well

as clean, and attention to the purity of their water. This last is considered of such importance that it is not even suffered to be tainted by the breath of the beasts; and yet, it is a fact that cattle frequently prefer the water in ponds impregnated with the urine of other animals: but this probably arises from its containing salts, which instinct points out as beneficial to their health.

It has already been intimated, that the best summer food for cows is good grass, spontaneously growing on sound meadows; but when these are shut up, *tares* and *clover*, either cut or pastured, may be very advantageously substituted. There is a prejudice against *tares*, as they are supposed to render the milk *ropy*: but we have been assured by a farmer who kept twenty-one cows of a mixed breed on the verge of Epping Forest, that he soiled them night and morning, during a great part of the summer on *tares*, without any other assistance than the common pasture of the forest, and that not only there was not the least appearance of ropiness in the milk, but that it was far richer than when the cows were fed on meadow grass, and that the butter was always of the finest quality. The other additions to hay for winter food are those most commonly employed for fattening cattle:—*parsnips* and *carrots*, which roots not only render the milk richer, but also communicate to the butter made from such milk a fine color, equal to that produced by the most luxuriant grasses:—the *mangel-wurzel*, which, on the continent, is preferred to every other vegetable for feeding cattle in general:—*potatoes*, on which cows will thrive well, so that with one bushel of these roots, together with soft meadow hay, they have been known to yield as large a quantity of sweet milk, or butter, as they usually afford when fed on the finest pastures; but alone, it has been proved by various experiments that potatoes will not support a cow in milk; they may add to the flow of it when given with hay, but the chief dependence must be upon the latter; carrots are far superior:†—*cabbages* are likewise of eminent service in this respect, but they require to be given with a good portion of fine hay; and, as well as *turnips*, the utility of which is too well known to require any particular detail here, they are apt to impart an unpleasant flavor to butter, unless great care be taken to remove all the decayed leaves:—*fog*, or *rowen grass* reserved for winter use, which is cut and carried to the animals:—*pulverised oil-cake*, *linseed-jelly*, and *grains*. By the judicious use of these various articles, together with a due admixture of dry food, considerable nutriment is thrown into the system, while the regular secretions will be excited, and the quality of the milk very materially improved.

Mr. Cramp's cow, mentioned in the last chapter, was soiled during the summer, on clover, lucerne, and roots—chiefly carrots—three or four times in

* In the Island of Jersey, about 35 pounds of parsnips are given daily to the dairy cows, with hay. They are found to improve the quality of the cream, which is more abundant than from an equal quantity of milk from cows differently fed. Seven quarts producing as much as seventeen ounces of butter—and the flavor of the latter is superior. *Quayle's General View of the Norman Isles*.

* Baron d'Alton in Communications to the Board of Agriculture, Vol. I.

† See the Agricultural Survey of Sussex, p. 259.

the day; and had four gallons of grains and two gallons of bran mixed, given to her regularly at noon. The same allowance of grains and bran was continued throughout the winter, when she had hay in addition, with occasional roots: she was fed five or six times in the twenty-four hours; and always when she was milked. Great care was also bestowed on the cleanliness of her stall and trough; and her udder was daily washed with cold water.

In some parts of Flanders, after the corn crops have been reaped, the ground is lightly ploughed, and sown with *spurry*. The cows are tethered on it in October, and a space allowed to each proportioned to the quantity of food that is necessary. The butter from the milk thus obtained, is called *spurgule butter*, and is not of equal quality with that produced from the common food.*

The following mode of feeding milch kine is practised, to a great extent, in the county of Middlesex, from which the inhabitants of London chiefly derive their milk. During the night the cows are confined in stalls, and about three o'clock in the morning each has a half-bushel basket full of grains given to her; when the operation of milking is finished, each receives twice that quantity of turnips, and shortly after one truss of the finest, softest, earliest made, and greenest meadow hay is divided among ten cows. These various feedings are usually made before eight o'clock in the morning, when the animals are turned into the cow-yard. Four hours after, they are again tied up to their stalls, and supplied with the same allowance of grains as they had received in the morning; on the conclusion of the afternoon milking, (which generally continues till near three o'clock,) they are served with a similar quantity of turnips; and in the course of another hour, with a like allotment of hay. This method of feeding usually continues throughout the turnip season, that is, from November to March: during the remaining months they are fed with grains, tares, cabbages, and the proportion of rowen, or second-cut meadow-hay, already mentioned; and are fed with equal regularity until they are turned out to grass, when they pass the whole of the night in the field; and, even, during this season, they are often fed with grains, with which some cow-keepers mix common salt, with a view to preserve them longer in a sweet state. But this practice has much declined, as the proprietors, who tried the experiment, did not meet with an adequate return for their labor and expense;†

* Sir John Sinclair's hints on the Agriculture of the Netherlands, &c.

† Middleton's Agricultural Report for the County of Middlesex, 8vo. This intelligent reporter further states, that brewers' grains may be preserved, in a sweet state, from March till summer, when brewing is continued, by tightly treading them down as low the surface of the ground, and covering with a layer of earth, in order to exclude the air, and prevent fermentation. They are in fact, preserved for a much longer period, and are said to have a sweeter, and in good order after a lapse of time, grains increase the quantity of the milk; but this answer of the London cow-keepers, to whom the subject is a secondary consideration. The same is said of common turnips, though Sweden has a great disadvantage.

though it has been asserted, that the mixing of salt with the food of cows (which will eat it with great avidity) both increases the quantity and improves the quality of the milk, while it contributes to promote the health of milch kine.

In Yorkshire, milch cows are allowed the best pastures during summer, and are usually housed about Martinmas, when their food is generally turnips and straw, or where turnips are not cultivated, hay; but a difference is made between those cows which are rather fresh of milk, and those which are nearly dry, the former having a larger portion of turnips, with the addition of hay, whilst the latter are put off with little else than straw until within a few weeks of calving, when hay is allowed.* In Essex the system is nearly the same, except that the produce of the dairy being chiefly butter, turnips are seldom given: rowen hay, as being the softest and the greenest, is preferred, and the consumption is calculated at two loads (of eighteen cwt.) in the winter, with two acres of summer pasture, and some straw while drying off.†

In the course of the preceding statements, the *stall, or house-feeding*, of cows during the winter in Holland has been mentioned; and, from the remarks of Baron d'Alton,‡ it appears that this method of feeding is there adopted throughout the year with greater profit than can be obtained from pasturing. The Baron indeed says, that cows must be early trained to the confinement of stall-feeding, otherwise they do not thrive; but, as the advantages of soiling and stall-feeding are so great, there can be no difficulty in adopting it, and executing it where it is intended to keep calves of a particular breed, as they may be easily reconciled to the confinement.

Sea-weed has of late years been given to cows by way of *condiment*. Mr. Macallum, a cow-keeper of Edinburgh, gives his milch cows seaweed in lieu of turnips, when these roots are scarce and dear, particularly in the months of February, March, and April. He uses the *fucus digitatus*, or digitated sea-wrack, and the *fucus serratus*, or serrated sea-wrack, but not the *fucus vesiculosus*, or common sea-weed, lest it should fill the animals with wind. Mr. M. begins by parboiling the sea-weed, and giving the cows some of the liquor: at first they sometimes refuse it, but when they drink the water, they are then offered some of the parboiled weed itself; and, when they eat it parboiled, it is afterwards gradually given to them raw. He gives each cow, once or twice a day, as much as a person can readily carry at once between his two hands. These marine plants possess no astringent qualities, and Mr. M.

and may prove a useful hint to those who are at a distance from the coast, in regard to the employment of common salt.

The use of salt for various agricultural purposes to which it could be profitably applied has hitherto been prevented by the heavy duty on its consumption. That impediment is now, however removed; and it may, therefore, be expected to become an object of serious attention to every one engaged in husbandry, and more particularly of those engaged in the management of cattle; some of the advantages of its application to which stock may be thus enumerated:—

I. It restores the tone of the stomach when impaired by excess in other food, and corrects the crudity of moist vegetables and grasses in a green state.

II. It helps digestion, keeps the body cool, by which many disorders are prevented; and it destroys botts.

III. It renders inferior food palatable; and is so much relished by cattle, that they seek it with eagerness, in whatever state it may be found, and have been rendered so tame by its use, that if they stray from their pasture, they will return at the usual time for their accustomed allowance.

IV. When given to cows, it increases the quantity of their milk, and has a material effect in correcting the disagreeable taste it acquires from turnips.

It has, in fact, been long used for cattle of all descriptions in the East Indies, in America, and in various parts of Europe, and among other experiments of its effects that have been tried in this country, is one recorded by Mr. Curwen, who employs it largely at his extensive farms, and who gave it from the 19th November, 1817, to the 3rd February, 1818, to his stock, in the following proportions, viz.:

Stock.	Number.	Quantity.
Cows and breeding heifers	40	4 oz.
Young and fat cattle	43	3 "
Working oxen	18	4 "
Heifers and young oxen	21	2 "
Young calves	20	1 "

During which time they remained in the highest health.*

Steamed chaff may also be given to milch cows with great advantage. Mr. Curwen, whose judicious zeal for the improvement of agriculture is too well known to require any eulogy, uses a steam boiler of 100 gallons contents,† on each side of which are fixed three boxes, containing eleven stone each of chaff, (cut hay and straw, with the husks of corn,) which, by being steamed, gains more than one-third of its original weight. The chaff is conveyed by various stop cocks into the boxes; and thus two or three boxes may be steamed at the same time; the

quantity of fuel required is about two lbs. for each stone of chaff.

In giving the steamed chaff to the cattle, two lbs. of oil-cake are mixed with one stone of chaff; and the milch cows and oxen are fed with it morning and evening, having an allowance of one stone at each time. On being taken from the steamer, the food is put into wooden boxes, which are mounted on wheels, to be drawn to the place where it is intended to be used; and the chaff requires to stand some time before it is fit for use. Mr. Curwen estimates the daily cost of food for each cow as follows:

	Pence.
Chaff, two stone, steaming, &c.	1
Oil-cake, four pounds	4
One cwt. of turnips	4
Wheat straw	1
Total	10

The average of milk on a stock of thirty-six milch cows, was nearly 13 wine quarts for 320 days; which was sold at 2d. per wine quart. The calves brought from £2 to £5 for rearing. The produce is stated by Mr. Curwen to be nearly half clear profit, estimating the manure as equal to the calves. The cows were never suffered to be turned out; and to prevent their being lame, their hooves were properly pared, and they stood with their fore feet on clay. One great advantage attending this method was, that most, if not all the milch cows were in such a condition that, with a few weeks' feeding after they were dry, they became fit for the shambles, with very little loss from the first cost. As a substitute for chaff and oil-cake, Mr. Curwen recommends cut hay; which, when steamed, would make a much superior food, and he entertains no doubt would greatly augment the milk, as well as benefit the health and condition of the animals. Of this there can be little question; for straw, or even the corn-husk, which is said to contain more nutriment, can add but little to the product of milk: it may keep store animals from starving, but it will never improve their flesh; and it may be received as an axiom, in feeding all animals, that the value of the food is in proportion to the quantity of nutritive matter contained in its component parts. Bulk is also necessary to sustain the action of the stomach; but it serves no other purpose.

Mr. Curwen gives cooked food from October to June, nearly eight months out of twelve, and his plan of treatment has been adopted by several farmers in different parts of the kingdom, with the most complete success: it is also partially practised in the Isle of Man, where the cottagers have long been in the habit of pouring boiling water on the chaff with which they winter-feed their cows;* as well as in some parts of Scotland. Pea-meal is also given by some Scotch dairy-men, by whom it is said that "no food is found to produce so much effect." The following method of preparing it, combined with chaff and turnips, as customary at Kyle, in Ayrshire, which we copy from a recent publication, seems to merit particular attention:—

"Take a bushel of chaff and eight or ten sound yellow or Swedish turnips, having the tops and

* Agricultural Survey of the Isle of Man, p. 109.

John Sinclair's Code of

in the 30th volume of
of Arts, from which it
See also, for various
other with plates, the
Husbandry," in the
of Useful Knowledge,

tails carefully taken off, and boil them together four or five hours. Add as much water as will cause the hand to move easily through the mass. Squeeze down the turnips, and add three pounds of pea-meal. Give this to a cow in the morning, and the same in the evening, with as much sweet hay as she will eat up clean five times a day, and without much expense, her butter will be as rich and of as fine a flavor as can be produced in winter. Should the peculiar flavor of the turnip be detected, which is not likely, a small quantity of saltpetre put to the cream will take it off.*

The plan of feeding adopted by one of the greatest dairy farmers in Scotland, Mr. Ralston, of Fine-View, is as follows: until the grass rises and affords a full bite, the cows are kept in their houses, but are then sent out to pasture. In hot weather they are fed on cut grass, in the house, from six in the morning until six in the evening, and are out at pasture all night. As the soil is dry and sandy, when rainy weather comes house-feeding is discontinued. In harvest, when the pastures begin to fail, the cows are fed partly on second clover, and partly on turnips scattered over their pasture. As the weather turns colder in October, they are housed at night, and in severe weather during winter; also through the day, receiving oat-straw with turnips. These roots are partly stored, and the supplies of them ordered so as to protract the feeding; when they fail, Swedish turnips and potatoes follow, with dry fodder. Chaff, oats, and potatoes, are boiled for the cows after calving; and the calves get rye-grass and clover-hay during the latter part of the spring.

The cows employed are of the Ayrshire breed, and are said to yield the amount of their own weight and value annually in cheese.†

[To be continued.]

For the Farmers' Register.

ON HORIZONTAL PLOUGHING.

Much has been written in this work, on the subject of hill-side ditches and horizontal ploughing. Believing this to be a most important improvement for our middle country, and, indeed, one without which, all others would be nearly unavailing, I beg to be indulged in a few remarks on it.

The writers on this species of improvement, have differed a little on the details of management, but have conducted their differences of opinion with candor and gentlemanly courtesy. Pity, but political and religious polemics could disagree as pleasantly as we farmers! The design of all the plans of levelling recommended, is doubtless, to save our gravelly and sandy country from being torn into gulleys—to prevent the upper and most fertile earth from being washed away, and to preserve—not merely the moisture, but also the soluble matters contained in putrescent manures, on the land.

The retention of moisture, in our arid country, is no trivial matter. Our crop of Indian corn is almost every year shortened by drought. Every practical planter knows how much this evil is ob-

viated, by covering up the roots, while there is what we call a *good season* in the earth. It must also be admitted that any mode of ploughing which confines and retains the water of hasty showers, must be beneficial. There can be little doubt, but that our thirsty high lands need as much ditching to keep the water on them, as marshy low grounds do to take it off.

Gulleys form, perhaps, the greatest opprobrium on Virginia cultivation. The traveller, go almost where he may, is disgusted by their ghastly yawning. But if the "looks" were all, we would not so much regard it. Gulleys operate on land, as ulcers do on animals. They drain from it, not only its moisture, but all its valuable juices. The plan of horizontal ploughing and ditching, affords the only remedy and preventive. I would here beg leave to offer my cordial thanks, both to those who first invented, and to those who introduced into middle Virginia, either of those improvements. I would be glad to do homage to every benefactor—more especially to every agricultural one. I have heard it stated that some merchants in Scotland invented horizontal ploughing, and that the late Gov. Thomas M. Randolph, of Albemarle, introduced it here. I know not, to whom credit is due, for the discovery of hill-side ditching. Perhaps the editor, or some of his correspondents could tell. It has been about twenty years, I think, since I learned that it was practised both by Mr. Bruce of Halifax, and Mr. Humberston Skipwith of Mecklenburg.

I think I have seen more soil carried off from a field by one great fall of rain, than could be brought back by the whole laboring force of the farm in an ordinary life-time. Any remedy for so great an evil—though far from infallible—though practically very difficult and very expensive—would deserve prompt and serious consideration. The remedy proposed, may be pronounced almost infallible—when properly executed—and the difficulty and expense—beyond that incurred in the ordinary mode of cultivation—unworthy the regard of a man determined to improve.

The operation by means of what is usually termed the rafter-level, is acknowledged to be tedious, especially in windy weather. But it may be necessary to use it, where great accuracy is desirable, in giving one inch fall for every span of the rafter, in very steep lands. But, having no steep lands to operate on, and no experience in their management, I would not presume to pronounce on the best mode in relation to them. I know that very broken grounds afford frequent outlets from furrows and ditches, for the water, along their numerous rivulets and irreclaimable ravines. In such situations, all surplus water may be readily discharged; and it is a matter of importance to do this along channels of such gradual descent, as to remove the danger of washing. This is usually done, I believe, by nailing a little block about one inch thick, on the foot of that leg of the rafter pointing towards the proposed outlet, while as strict attention is paid to keeping the plumb-line adapted to the centre-mark on the cross-piece, as if the work were progressing on a perfect level.

Lands of less acclivity afford these outlets much more rarely, and sometimes none at all, in a large field. In such situations, were graduation of the ditches and furrows attempted, it would produce a

* Library of Useful Knowledge: Farmer's Series, No. 12, p. 45, 1830.

† Agricultural Survey of Ayrshire, and of Dumfriesshire, Appendix p. 643.

very inconvenient and often unmanageable accumulation of water: or if the ditches and furrows were not very deep, an overflow would occur, sweeping every thing before it. This may be prevented, where rock abounds, by paving straight down-hill channels, as passages for the water. But, where rock is scarce—which is apt to be the case on such lands—I know no reliance so safe as that on furrows and ditches perfectly level. If these are accurately and deeply made, so that each spot of ground has charge only of the water which falls upon it, no ordinary shower can injure. But even in our heaviest falls of rain, should the bank in any given spot overflow, the water may have to traverse a considerable distance before it can acquire a further descent; and, as it is rapidity of current, in a direct descent, which produces gulleys, this mode of management offers the best preservative against them, in my knowledge. I have practised it successfully for many years, and, at my present residence, which I have occupied for eight years, I have obliterated hundreds of small gulleys, and many large ones, which had formed under the old mode of ploughing. It is true, that in a large field, two or three breaches may be found in the banks. This, however, is not ascribable to the mode of ploughing, but to a careless departure from it; and may readily be remedied, by moving the ditches at such places, a little higher up the hill; or, by forming dams across them, at suitable places, on each side of the breach, to stop the current of water tending that way. Indeed, such dams across the ditches might be advantageously made, by way of safeguard against the too great accumulation of water in one place, even where no breach has actually occurred. This would be in accordance with a plan proposed by a sensible writer in some number of the Register, of making dams, even across graduated ditches, in order to retain water from slight showers.

Having objected to the mode of operating with the raster-level, that it is tedious, and believing that this difficulty deters multitudes from levelling at all, it becomes me to offer a substitute, which I know by experience to be more expeditious, and to answer the purpose well—at least on lands lying well. The implement which I have most commonly used, resembles in shape, a common pair of winding blades [or reel.] It has two horizontal cross-pieces, three feet long, at right angles to each other, firmly braced at the point of their intersection, on the head of a stout and strong upright staff, and accurately at right angles to it. This upright should be about five feet in length; its lower end should be sharpened, for sticking in the ground—a slit or mortice should be cut through it about two and a half feet long, exactly in the centre of which a silken cord should hang, with a small bullet at its lower end, immediately over a small pivot, or other mark indicating the centre of the staff, at the lower end of the mortice. A very thin piece of wood, or a piece of leather, should be fastened on one side of the mortice to keep off the wind from the plumb in levelling. With this implement, a brisk and intelligent overseer with two good assistants, after a little experience, may level an hundred acres of gently undulating land, in a day.

In operating, the leveller should station himself on a hill-side, and adjust the plumb of his level,

near the head of a gully—if there be one. One of his assistants should stand just above the head of the gully, with a black staff or rod eight or nine feet long, with a strip of white paper tied around it, for an object for the leveller to sight at. The rod should be placed perpendicularly on the ground, and the paper made to range with the eye of the leveller, who looks over the cross-arms of the level. The bearer of the rod should then be sent on to another station. Another assistant should with a hoe, plainly mark the ground at each station of the rod-bearer and between them, carefully curving his line of marks, to suit the shape of the hill, to prevent angular ploughing, when he comes to guide the plough along his track. It is well, if the ploughman himself should carry the black staff, using the marker when he begins to plough the ditches, as a guide to his team. The leveller will be surprised to find how nearly to the same level the heads of all gulleys on a hill-side are located, when he traverses the hill on a level, near its brow. After making provision for ditching just above the heads of all the gulleys, so as to keep the water out of them, the operator may proceed to levelling the remainder of the field. This he may do, by going higher up, or lower down the hill as he likes, recollecting, that the level ditches will approach nearest each other, in the most precipitous land, and that of course, one of such places should be chosen, in which to start a new line of levelling. As it is important not to lose time in frequently adjusting the level, spots affording the widest range of vision, should be chosen for this purpose. These are commonly bottoms or ravines, with hills on each side. When necessary to change the station, the black rod may be set up at the mark last made with the hoe, and the paper moved up or down on it, to suit the sight over the arms of the level. This can be done much sooner than the level could be adjusted to suit the original height of the paper, and much time is saved by it. I have usually found it best very gradually to elevate the ditches a little above the level, around the heads of gulleys and bottoms. In doing this, I tie a number of strips of paper an inch or two apart, around the black rod, sighting at the one immediately below the hand of its bearer, directing him to elevate or depress his hand to suit me, as he changes his stations. A practised eye, however, can do this graduation tolerably without the aid of the papers.

The black rod may be dispensed with in clean land, and the operator may sight at the ground. But the work cannot be done so well, as clods and hillocks confuse the vision when sighting at a distance. In high weeds and broom-sedge the rod is indispensable. If the rod is made long, and the land is nearly level, the operator may save time by carrying on two marked lines from one station. To do this, he sights at a paper near the lower end of the rod for the line above him, and at one near its top for that below him.

There are several objections to this implement. It is very liable to be warped out of level by the sun and weather, and to be jostled or wrecked by the force requisite to drive its point into the ground. It should therefore be made as strong as possible, and of good timber, with the cross-pieces guarded, as well as possible, against warping. It will then do good work. A well made metallic one would be free from these objections, and would not be very

costly. If such cannot be procured, and wood must be used, I prefer an implement made in the following manner: Make a box, resembling the frame of a small table or wash-stand, without plank on its top, eighteen inches, or two feet across. Cover its sides two feet deep with thin light plank, to protect the plumb from the wind. The plumb should hang from the centre of intersection of two diagonal cross-pieces in the top of the box, and over a like centre of similar pieces in its bottom. This table or box may be supported by its own legs terminating in sharp iron spikes, to stick in the ground—or the legs may be fastened on with strong hinges, to be opened out in adjusting the level on uneven ground—or it may rest on a board supported by a three-legged staff (the legs moveable.) Whatever be its support, it should be tall enough to save the operator from the drudgery of stooping, while taking sight over its top, which should be exactly level and at right angles to its sides.

The mode of cutting the ditches can best be determined by each proprietor, who will be guided much by the nature of his land and his quantum of force. I have used a four-horse plough, but found after the ditches began to get deep, that so many horses encumbered each other. I prefer after marking off the track, with one steady horse, to complete the work with two, repeatedly running along the same furrows, until the ditch be wide and deep enough. The loose dirt should be drawn out of the first ditch cut, with hoes, while the plough is cutting others. This work may be performed by small hands.

It remains to be remarked, that the ditches, after they are made, should be used as guides in ploughing the beds next above and below each one of them, and that the ground left in the middle, after the beds parallel to the ditches, shall have, in some places, come together, should be thrown into short beds. This plan affords, as receptacles for the water, both the level ditches and furrows belonging to the beds. If the ploughman be skilful, he will need no assistance in forming beds parallel to the ditches. If unskilful, his horse must be guided by a stick, corresponding in length to the width of a bed, the other end of which is held before the breast of a boy, who walks in the guide-ditch or furrow. In this manner, the first furrow of each bed may be laid off, and the remainder of the ground ploughed by other ploughmen, or by the same one afterwards.

The foregoing minute details would doubtless appear very tedious, to the adept in levelling—for whom they were by no means written. The novice will probably not complain of particularity. They are submitted to the will of the editor.

M. N.

From the Proceedings of the Massachusetts Agricultural Society
(December, 1834.)

BUTTER AND CHEESE.

To the Committee on Butter and Cheese of the Mass.
Society for promoting Agriculture:—

My cows subsist entirely on grass in summer. I salt them three times per week. A little time before I turn them out to grass in the spring, I give one quart of cob meal to each per day. I give my

rowen* to them when I first put them up to hay in autumn—think my rowen worth more at that season than in the spring.

Respecting the treatment of milk and cream. My milk is set in my cellar at a little distance from the cellar bottom. The cream should be separated from the milk when sweet and should be kept cool. I have a cellar 10 feet square and 9 feet deep in my cellar, where I put ice in hot weather, and there I can make my cream of a right temperature. I have a stove in my upper cellar, so that in cold weather my cream is also of a right temperature. I churn in summer three days in a week. The butter is taken from the churn as free from buttermilk as possible, then worked with the hand and salted. There can be no ladle to supply the place of the hand. The butter then stands an hour or an hour and a half, when the butter is worked until the buttermilk is entirely expressed; then it is ready to lump. Respecting salt, I always send for the best quality of butter salt; I do not know the name of it. If I get a lot that proves not to be of the best quality, I take it for other purposes, and send again for the best kind; for I think it a very essential thing to have the salt fine, white, and of a good flavor. The butter should be salted according to the taste of those who are to use it. There are a variety of tastes respecting the quantity of salt. I use no other substance in butter but salt. I think saltpetre a dangerous article in cheese, and should think it would have a bad effect on butter, though I do not know as I ever saw it tried. Respecting preserving butter in summer, the vessel should be thoroughly cleansed; and a little salt sprinkled over the inside of the vessel. It should be kept perfectly tight to prevent the air getting to the butter. When I have kept butter through the summer, I have put it down in white oak casks, and head them up until they were wanted for use; then unhead the casks and put on a lid. From my own experience I think white oak vessels the best for preserving butter, yet I wish for information from the committee and other gentlemen concerning this thing. Those who buy our butter can best judge what vessels are the best, and if the committee or the trustees of the Mass. Agricultural Society will take the trouble to satisfy themselves as to what vessels are best, and recommend them to the dairymen, it will be an advantage. Had I known of your exhibition soon enough I would have put up some in pots at the same time I put down in firkins, that you might have a chance to ascertain which is the better.

Gentlemen, I know you love good butter and cheese by your exertions in offering those liberal premiums, and as you have bestowed a good share of them on me, I feel myself under obligation to give all the information that I can to you. The dairymen want to get rich too fast; this is a great reason why you do not have better butter. At this season of the year the cream ought not to stand on the milk more than 12 hours in order to make good butter: of course we do not get but one half of the cream. There will rise another coat of cream, which may be applied to other uses

*This name is given in England, and it is therefore supposed, also in Massachusetts, to the second growth of meadows, left to stand for grazing in the succeeding winter or spring.—ED. FARM. REG.

except for butter. It is a practice in all the dairies with which I am acquainted to get all the cream they can, and make all the butter they can, and get as good price as they can; but I see their mistake. Put a quantity of the second skimming of cream to that milk from which the first cream is taken, and it will make about as good cheese as four meal cheese; and I think by not trying to make so much butter, but a better quality, and a better quality of skim milk cheese, I saved enough the last year to pay my labor on my farm. You cannot expect so nice butter at this season as when we have fresh feed, yet you can see how little variation there is in my butter by that which I now offer for exhibition according to the Nos. beginning at the first. The butter in boxes was made by hay, and some of it of an ordinary quality, as I could not get at my best hay.

The management of cows is also an essential requisite for making good butter. The cows must be kept so as to be clean for milking, or the butter cannot be nice. Cleanliness and prompt attention to every thing are the indispensable requisites for making good butter.

LUTHER CHAMBERLAIN.

Extract from the report of the Committee.

The committee, after a careful examination, awarded the first premium to Mr. William Bachop, of Barnet, Vt. It was with some difficulty they decided between this lot and one offered by Luther Chamberlain, both of which were very prime. They based their final decision on the fact that Mr. Bachop's butter was equal, at least, to Mr. Chamberlain's, and, from the manner it was put down, appeared more likely to keep.—His dairy is supplied from twenty-one cows, kept in the usual manner, on grass in summer, and hay and grain in winter—the milk kept in tin pans, and churned every morning if the weather is warm—the butter-milk is removed by frequent washings in water, and four pounds salt and one pound sugar used for each hundred weight of butter—packed in wooden vessels, and set in a cool place.

The committee found no difficulty in awarding the second premium of \$50 to Luther Chamberlain, of Westborough. The butter from this dairy has long been celebrated. Mr. C. seems to enter into the true object of this exhibition by furnishing a particular description of the manner in which it is manufactured. His letter, though long, is interesting, as coming from a practical man, and the committee think they need not apologize for inserting it entire.

The committee have inserted Mr. Chamberlain's letter at length, as a valuable exposition of the manner in which he makes butter, and as an example for others to follow. That he pursues the best course in its manufacture they can have but little doubt, and they feel certain that in attending as he does to quality, rather than to quantity, he secures at once both reputation and profit. No stronger proof can be given of this than the fact that his butter which took the second premium sold at auction for a higher price than that to which the committee awarded the first, which could only be accounted for by the fact that purchasers felt certain that in taking Mr. C.'s butter they obtained a first rate article, as he suffered none that was inferior to come from his dairy.

ON THE CAUSES TO WHICH THE RUST IN WHEAT IS ASCRIBED.

Brookfield, (Henrico) 8th Dec., 1834.

To the Editor of the Farmers' Register.

In the number of the Register for this month, is an article over the signature of "Medico Agriculturist," in which he has endeavored to point out the cause which produces the effect of rust on wheat and other plants. The many diseases which affect wheat and other grains, have engaged much of the attention of practical farmers and scientific men; and notwithstanding the diversity of opinion which has hitherto, and probably yet exists, as to the causes producing these diseases, it did not appear to me, until very lately, that the true causes have been discovered. In saying so, I would beg to refer "Medico" and your other readers, to an article in the October number of your Register for this year, copied from the Penny Magazine, entitled "Diseases of wheat," describing a number of highly interesting and scientific experiments by Francis Bauer, Esq., "on the smut balls or pepper brand," and "smut or dust brand," &c. The highly satisfactory nature of the result of these experiments, must, in my opinion, set aside all future doubts, as to the true causes of these diseases. Other writers on this important branch of vegetable pathology, have attributed the perfected disease, to a mass of parasitic fungi; but without tracing their origin. Amongst these I might mention Willdenow. Mr. Bauer himself, if I am not much mistaken, was at one time opposed to the theory which his own subsequent philosophic experiments, have so satisfactorily proved to be true; although, no mention is made in these experiments of the particular disease termed *rust*—(a disease which to my knowledge exists both in England and Scotland to as great, if not greater extent than it does in this country, at least so far as my observation has led me.) I am of the decided opinion, that this disease is also produced by a similar cause as in the above mentioned diseases—and that the appearance on wheat and other grains termed *rust*, is a collection of extremely minute fungi, whose seeds are propelled by the rising sap in the same way as are the seeds of the "uredo fetida" and "uredo segetum," as described by Mr. Bauer. But should the true cause of rust be the flow of juices, as maintained by "Medico," I am inclined to believe that the effect is produced, not by an overabundance of sap in the "supplying organs," but by a very opposite extreme. By a careful examination of a stalk of wheat on which there is rust, it will be found that the root is diseased: hence I am led to conclude, that the vital principle, or propelling power is weakened, and that the plant, in consequence of the diseased state of the root, is unable to absorb a sufficient quantity of sap to give the necessary vigor to the propelling power; and that after the return of the cambium or proper juices from the elaborating organs, there is not sufficient power to propel it into the finer organs of the parts of fructification—at which part of the plant, an accumulation of the cambium takes place, and by shortly getting in a morbid state, it infects the internal parts of the stalk, and subsequently penetrates the epidermis, and causes the flow of juices, which by induration and exposure to the air might assume the appearance of rust.

As to the diseases which affect vegetating cotton or tobacco, I have had no opportunity for observation, but the "black spongy formation," sometimes to be found in the ear of corn, which "Medico" alludes to as being also the effect of a flow of juices, is so much like the disease in wheat and other small grains, called "smut, or dust brand," and clearly proved by Mr. Bauer to be caused by the seed of the *uredo segetum*, that I have no doubt this disease in corn originates in the same way—and that the "black spongy appearance" is also a mass of fungi. There is one peculiarity which I have observed on the stalks of corn affected by this disease—which is, that the leaves, though they maintain their general color, show evident symptoms of disease. They will in most cases, be found to have become shrivelled in many places, which I think, indicates the existence of some substance, propelled through the coarser organs for the ascent of the sap—and which meets with some resistance in the finer organs of the elaborating portion of the plant, as no external injury is discernible.

The remedy pointed out by "Medico," is one, even allowing his theory to be true, which I believe few farmers would be willing to adopt: the cure in this case would be much more injurious to the farmers' interest than the disease itself. The experiments of Mr. Bauer fully prove, that to steep seed grain in lime-water for a proper length of time (twelve hours,) effectually destroys the seeds of these minute fungi, and I have no doubt would also prevent rust. Washing seed grain in lime-water, has long been the practice of many farmers; but not being allowed to steep for any length of time, the benefit as might be anticipated, was very partial. If soils containing the seeds of these fungi were manured with lime in addition to steeping, the seed in its solution, an additional benefit might be derived.

I hope that "Medico" will attribute the above remarks to the existence of the same feeling which I consider as having prompted his—a sincere desire to promote the best interests of agriculture, whose prosperity is the bulwark of any nation. It must be gratifying to every practical agriculturist to observe, that men filling influential and learned professions in society, and who, from their general education and scientific acquirements, are well qualified to aid them in the more scientific, but not less necessary part of their profession, come forward and present such investigations, with that object in view. There is yet room for many *Oberlins*.

A. N.

[We are much gratified in being enabled to present the following information from a very intelligent and practical farmer of Pennsylvania. Several previous efforts to learn what means were used to crush or grind bones, which had been requested by correspondents, had been made without success. It will be seen from Dr. Gibbon's letter, that bones very coarsely broken serve well—and that without any mill, or machinery, other than heavy hammers, or old axes, bones may be prepared on every farm for use. Every farmer in the country may then make a limited use of this very rich manure—and some near towns, may obtain considerable quantities where the carcasses of dead animals

are thrown, and from various other sources still more abundant.

The mill described below as serving for crushing bones, and also for corn with the cobs, may be obtained for about \$60. Such a one, (worked by two horses) is used both for crushing corn and gypsum, by George E. Harrison, of Brandon.]

ON THE MANNER OF PREPARING AND APPLYING BONE MANURE.

To the Editor of the Farmers' Register.

Petersburg, Va., January 16th, 1835.

You inform me you wish to know something of the mode of breaking or crushing bones, so that they may be applied to the purposes of agriculture; and of the general method of using them on the land. I can offer you some details with respect to this important manure, as it is much used in a certain part of the county of Philadelphia.

The first purchase I made, was from a man who had been induced by some reading farmer to grind up the coarse knuckle bones and offal slips, the *refuse* of the button makers, in a machine worked by two horses, and formed very much like a large coffee mill—which was afterwards employed to grind Indian corn, with the cobs, for horse feed. I have seen another kind, something like a cider mill, (but attached to a water-power) with horizontal iron notched rollers, which I understood was similar to those generally used for the same purpose in England, where there are bone mills in all the principal agricultural districts, supplied from the continent with large quantities of "raw material," gathered from the battle fields of Europe. The trade in bones was thought so important some years ago, that an objection was made in the British House of Lords, to the number of foreign vessels engaged in this active commerce. It may be well to state, that our ability to obtain a large quantity of bones for manure in the neighborhood of Philadelphia, depends very much upon different manufactories established there for making buttons, tooth brushes, umbrella and cane handles, &c. &c., which have very much increased since the duty of 33½ per cent. upon the importation of these articles from abroad—which creating a demand for the large round bones of the shoulders and thighs of cattle, has caused a great advance in their value here. These bones rose from 6 dollars to 24 and 30 dollars per thousand bones: the leg bones being smaller, are sold for lower rates. I know an enterprising manufacturer in our county, who made a very handsome profit by picking up a large quantity of bones, suited to his purpose, near several of the towns in Virginia, where cattle are slaughtered and salted for the shipping—although he had them barrelled, and paid the same freight as for flour, transporting them in the steam boat.

I recollect one large establishment for making buttons, in which the machinery was worked by steam, and a number of hands were employed, where the *refuse*, or offal bones, amounted to three cart loads in a week. The large ends were cut off by circular saws, which also divided the barrel of the bones into thin slips, out of which the buttons were cut. I contracted to purchase all the offal bones, and bone dust formed by the saws, at \$1 25 per cart load, and had several thousand bush-

els hauled a distance of twelve miles for manure. For ground bones I paid at first ten cents per heaped bushel; and for the rough large knuckles and *refuse*, five cents per bushel; afterwards nine and twelve cents per bushel. They are now higher from an increased demand. The practical chemists also employ them to form ivory black, and I believe, ammonia.

Before the manufacturers receive the bones, they are usually boiled to obtain their oil. This is employed to oil leather, grease cart wheels, and to form soap. A very *fat* Englishman was one of the first to introduce this process. He induced the butchers' boys to collect all the bones, instead of throwing them into the street; and every market day he hauled them away in a cart to his place of deposit. The first operation was performed by pigs—who ate any meat or fat adhering to the bones. They were then boiled and assorted—the perfect, large bones, being sold to the various manufacturers; and the rest to the chemists for ivory black, or to farmers for manure. As this man's business increased, his neighbors began to complain of the ill odor of his premises—and finding him insensible to their remonstrances, he was indicted for a nuisance, and his establishment declared prejudicial to the public health. Being himself, and also his wife and children, remarkably stout, ruddy, and well conditioned—although sleeping, eating, and living in the midst of a very offensive atmosphere, from animal decomposition—he was shrewdly advised by his lawyer, to make no other defence, than by arraying his family opposite the jury, and coolly appealing to their good sense, to declare him guiltless—which they did; but he wisely moved further out of town, to avoid giving further offence in the same neighborhood. This man often made contracts with the manufacturers he supplied with whole bones, to take the refuse; which he sold to the farmers mixed with the offal of his own establishment. He has made a small fortune, and retired to a farm well manured with bones.

The ground bones are applied to wheat, rye, barley, potatoes, buckwheat, and grass crops, with great advantage—but I do not think they benefit Indian corn as much, in proportion, as the others. White clover, Swedish and other turnips, and millet, are very luxuriant after the use of bones. The coarse large bones are scattered about without being broken, and ploughed under the ground. They are sometimes inconvenient, but I think equally active as the ground bones, if not more so, as they generally contain more fatty or oily matter. During the growth of a crop, the fibres of the plants will be found filling every crevice of the bone, as if eagerly seeking the most desirable nourishment. I have applied 150 bushels per acre, which I think too much; from 60 to 100 bushels, I believe the proper medium. Their effects are said to last a great number of years—and they certainly combine within themselves, the most valuable properties. In the upper part of the county of Philadelphia, not far from the Delaware, bone manure is very highly regarded, well known, and much sought after. The large bones about a farm are, by one very careful farmer I know, gathered together and broken up of rainy days, or at odd times; forming within a year, an important addition to the amount of manure.

The method of applying the bones to land, is not much varied—sometimes they are cast abroad before the land is ploughed—occasionally the ground is ploughed and rolled and the bones spread upon it, and ploughed in. Great care is essential in spreading, to divide and scatter this manure equally. An undue proportion in one spot will cause the grain to fall. Where the bones have been placed in heaps, the earth should be shovelled up closely and well spread—or the straw will be too rank, and fall without yielding grain. The button manufacturer, of whom I have written above, moved to New York, where he thought there was a more abundant supply of bones, through the canals from the west; for they are now a regular article of traffic—and this manufacture adds an item of profit to those who barrel beef and raise cattle. The large bones, if left under ground a few years when the land is in grass, will be found gradually to loosen, and disunite at their sutures—after vegetation has consumed the fatty particles, the periosteum or membrane covering the outside of the bone, and the membranes lining all the smaller cavities, disappear. The earthy particles remain united, but are constantly yielding to the action of decomposition, and mechanical divisions.

Bone dust, or roughly broken bones, form an excellent application for gardens. But although they contain so large a quantity of lime, and are immediate in their operation, they do not interdict the use of other manures, or of lime. The intermingling of a variety of substances, appears to afford the most acceptable sustenance to vegetables. The spontaneous growth of white clover is very much assisted, and its size and vigor increased, by the application of bones: and I think the amount of potatoes on a field in which only a part was boned, (the whole having been otherwise manured) was fully two-thirds more on the part boned, all other things being alike, than on that portion where there were no bones.

There are always lying about farms, valleys, towns, and water courses, a number of bones of different kinds, which are unsightly, noisome, and useless in their abandoned condition, and which would be well worth the attention of some of your active farmers. The gathering of them would be found much more profitable than many may conceive, who have never witnessed the results of their judicious application to the land.

I write you this desultory account, without any notes to assist my memory, and beg you to receive the hasty sketch, as an offering of my good intention. After viewing many of the marl deposits along the shores of James River, and seeing the variety of animal matter connected with them, I am inclined to believe you have near your doors, substances which will be found to approach in efficacy, the effects of the manure I have given you an account of.

J. H. GIBBON.

P. S. The most prompt growth I ever saw, was a hedge manured by laying cows' horns, horses' heads, pigs' jowls, and other uncouth bones, in a furrow opened by the plough, and covered in by the same process. Upon this line the hedge was planted, and grew rapidly and healthfully.

I forgot to notice some other manufactures

which also supply farmers, in their vicinity, with manures which may be novel to you. The *refuse*, or oil cake remaining after the expression of castor oil, has been used for wheat with very good effect. The bristles from the brush makers are also valued, and hauled many miles from town by the market wagons. The shavings and raspings from the comb makers are also thought equal to the bone manure by some. The horns of cattle are first cut, then softened, and finally pressed between heated plates of iron, and afterwards manufactured into combs of various shapes, and in very large quantity. Nuisances are thus converted into profitable conveniences, and yield capital and employment to many branches of industry, extensively useful.

For the Farmers' Register.

HOGS—LEGISLATORS—MANURE MAKING.

If it be true that "our country expects that every man will do his duty," it is time that my mite was thrown into the general treasury. Small as it is, I am encouraged by the recollection that this great globe itself is made up of particles, or atoms. If your numerous subscribers would only contribute each a small matter, having a strict reference to that which is practical, it would soon amount to valuable matter; for as "iron sharpeneth iron, so doth the wit of one man sharpen another." Had the poor widow been restrained by pride, the most beautiful illustration in the scriptures would have been wanting. Let me therefore beg that all your subscribers will show a willingness to aid you—for in this they will contribute to regenerate and rebuild our wasted country. It is time that every man who really feels for the state should show it practically. My soul is sick with *stump* and *barrel* love of country. Away with it—and let us rally around our country, and those who show their love by their fruits. My brother farmers may rest assured that "grapes are not gathered from thorns, or figs from thistles." A man will exert his best powers for his own family: it is there you can measure his talents, for you have his house and farm before you. I claim to be excused for those remarks, because I believe that the ruin of our state proceeded from *stump* and *barrel* legislators; for they "knew not what they did," else how could it be that the beasts of the field have rights and privileges that are not accorded to the owner? How could it be that the protection of the law was not given as fully to one kind of property as another? Why not subject the hog to the same rules and restraints as his master?

I was making extensive preparations for creating manure when the great snow came upon us. Ditch mud, and every kind of good earth I can get, is carted into the farm yard, with occasional dressings of lime. The whole mass will be carefully incorporated, and taken out upon grass or corn land in the spring. In this way, much land may be improved; but the cost will not fall short of five or six dollars per acre—for I have my oyster shells to haul seven miles. Some of my friends have been experimenting with stone lime, brought from the north; and I have every reason to believe that thirty bushels to the acre has doubled the crop of corn. If so, mother earth will pay her debt thus created, and have a surplus fund besides.

I hope we shall fall upon some practical mode of improving our Fairfax land, for if we do not, better would it have been that we never had been born.

JEREMIAH.

January 2nd, 1835.

GENERAL TOPICS CONNECTED WITH AGRICULTURE—AGRICULTURAL SOCIETIES, &c.

To the Editor of the Farmers' Register.

He who now doubts the beneficial influence of the Farmer's Register, is either an inattentive observer of passing events, or incapable of tracing obvious effects to their proper causes. I do not mean that any general defective system has been demolished, and one of greater perfection erected on its ruins; but simply that a spirit of interest and inquiry has been awakened, which must necessarily lead to desirable and profitable results. Were I challenged to adduce the proof, I would scarcely care to point beyond the recent formation of agricultural societies in different counties of our state. Many lugubrious reflections have been communicated concerning the suffering condition of agriculture; indeed the multitude of surrounding evidences is calculated to arouse from lethargy every patriot and philanthropist. We need only refer to the astonishing number of our citizens who are continually forsaking in despair, their patrimonial possessions, to seek a brighter destiny in the wilds of the west. The halls of some of our literary institutions furnish additional evidence, so plain that "he who runs may read." We see that although their professorships have been increased, their facilities multiplied, and discipline improved—scanty ranks and diminishing numbers assail their interests, and threaten to paralyze their usefulness. Under these circumstances I do not come forward in the spirit of empiricism, to propose the establishment of agricultural societies as a panacea for all the evils under which we labor, but merely to recommend their encouragement as the easiest, and, as far as it goes, the most efficacious remedy within our reach. Various other means have been suggested to effect the same object, generally however, either involving considerable expense, or an *immediate* departure from customs which have descended with our patrimonies. Am I too sanguine in the anticipation that these same results would be more likely to flow, from the source to which I have referred? I am particularly desirous to avoid any imputation of vanity, by inculcating any particular system of management, or by offering any specific substitute. I can only wish I were equal to the task—but in considering the disproportion between the magnitude of the object and the extent of my abilities, I am appalled at the arrogance of the attempt; and shrink from a responsibility I feel so little able to sustain. But a firm conviction that the establishment of agricultural societies is connected with the best interests of our country, and that its destinies are too seriously threatened to justify apathy, or to excuse silence, has impelled me to introduce to your notice the plan I zealously, but feebly, advocate. As long as the towering forest waved its lofty head over the extensive regions of fertile soil, the agriculturist was scarcely expected to turn from a prospect so inviting, to view and re-

pair the ravages of injudicious cultivation; but the want of new land, must now either turn our attention to the improvement of the old, or throw us into the current of emigration which is carrying from our state many of its choice and most valuable citizens. One who feels an honest pride for the land of his nativity, and expects in "weal or woe" to connect his destiny with hers, views this alternative with emotions of the deepest solicitude. The God of Nature did not give us a fertile soil and climate calculated to "quicken into life the products of the temperate zone and fruits of the tropics," thus to be abused, neglected, and abandoned. Without any of those calamities which have withstood the prosperity of nations, in a period of profound peace, under the operation of a government regarded as the most benign, and institutions the most salutary, the patriot is not yet left without hope. Something is only wanting to infuse a spirit of interest in the breasts of the farmers themselves, and concentrate their energies. If there be any occupation which requires "singleness of object, and firmness of purpose," surely it is theirs. But only let it be announced that a president is to be glorified, or the measures of his administration denounced by some political aspirant, and we see the sterile field, yielding but a scanty support to a suffering family, with the closest attention, readily and eagerly abandoned for the bustle and confusion of the court-yard. Perhaps very unsatisfactory answers would be given to the inquiry, what had been gained by the exchange? I am far, very far from wishing to curtail the rights of freemen, or objecting to the exercise of them—and only wish to show that objects of minor importance are eagerly attended to, while those of paramount consideration are entirely neglected. Had the meeting of an agricultural society been the scene of resort, perhaps some interesting and instructive essay on the proper method of making and applying manures, would have increased the beauty and productiveness of his farm. He might probably have seen some cheap and durable machine greatly curtailing manual labor—or different specimens of live stock, convincing him that particular breeds of each can be most profitably raised. Sufficient inducement is only wanting to bring any kind of stock into the country its interest may require. He might have learned that clover seed which cost him 7 or 8 dollars per bushel in the winter, could have been purchased in summer for \$3 50 cents—thus obviating one formidable obstacle to its general introduction; or, by the wonderful product of some acre of ground in corn, wheat, tobacco, or some other agricultural production, his cultivation of the article might be greatly improved. And even if none of these anticipations could be realized, he would find sufficient recompense in the cultivation of that social intercourse amongst his fellow farmers, so well calculated to lessen the acerbity of party rancor. The expense of this plan certainly cannot be urged as an objection, as few would complain of the annual contribution of 2 or 3 dollars, when it is to form premiums, which would be so diversified as to allow any person cultivating a farm, or engaged in any species of mechanical business, to come into fair competition.

I have thus, Mr. editor, followed the current of my reflections in delineating a few of the advantages which would result from the formation of ag-

ricultural societies. The subject is inexhaustible, and one which widens and expands with the progress of discussion; but I fear my desultory remarks has already caused you to regret the kind offer of your columns for original communications. Should the proposed plan be objectionable, there is not an individual in the whole community, who would hail the annunciation of an acceptable one with more applause than the humble propounder of this.

SHENSTONE.

Nottoway, Nov. 16, 1834.

From the Whig.

CANAL AND RAILWAY CARRIAGE OF HOGS.

Messrs. Editors.—This being the *pork-killing* season of the year, and what you and I know, to our cost, the *pork-buying* season also, the human mind seems naturally, if not vitally, turned to that subject.

We all know that the states of Maryland and Virginia, as well as North Carolina, below the Blue Ridge, are the *pork-buying* sections; whilst the parts of those states west of the Blue Ridge, together with Tennessee, Kentucky, Indiana and Ohio, are the *pork-selling* sections, to supply that vacuum—"Hiatus maxime defendendus."

I know not how it is with you, but with me, \$5 50 per 100 lbs. for pork, renders this a *killing-season* in more senses than one; and I have been casting about to see how we might get that article a little cheaper.

I have supposed, that so far as Ohio, Indiana, Kentucky and the Ohio parts of Virginia are concerned, if steamboats with fixtures to hold hogs, were introduced into use, the hogs of those sections might be cheaply transported, with corn obtained at cheap rates, to feed them to the Falls of Kanawha; and when that river shall be improved, as sustained by our friend, Joseph C. Cabell, (that true friend of the state, and of true state rights,) and the improvement carried through by a rail road to Covington, that they could be transported on that, with corn to feed them to that place; and if met there by canal navigation, could again go on, *corn and all*, in boats fixed for the purpose, to Lynchburg. From this place, they would proceed, *corn and all again*, to Richmond; or, leaving the canal, and disposing of their surplus corn now brought to the best market, seek a similar market for their hogs, on each side of the river.

To excite more attention to this subject, as well as to see whether *this trade* might not be fairly valued on as a source of profit to the James River and Kanawha Company, should the residue of that stock be taken (as surely it will, either by individuals or by the state,) I have endeavored, but without assistance from any one understanding the business, to draw a comparison between the expenses of transporting that trade, by the improvements above indicated, and the expense of driving the animals, in the present way, to market.

I wish some one, acquainted with the subject, would examine my estimates, and see wherein, and to what extent, I have erred, on either side, as well as give us some estimate of the probable forage of live stock, that might pass on the improvements proposed. My idea is, that it would be very great, and at such a rate as would enable the sellers to reduce the present prices.

Suppose 500 hogs, weighing 50 tons, transported on rail road cars, at 3 cents per ton per mile, (it would cost, I believe, less by boats,) this part of the expense for 100 miles would be, say	\$150 00
Suppose, including all delays, it takes 1½ days per 100 miles—the support of the hogs will be say 8 barrels of corn per day—this laid in where it is cheap, with its transportation, will cost, say \$1 75 per barrel throughout the line, Transportation of the owner and one attendant or feeder, at 4 cents per mile, cost	21 00
Board of owner 1½ days, say	\$8 00
Do. of his driver and his wages, say	1 50
Do. his passage back, say,	4 50-
	15 00

\$186 00

But the hogs being at rest, and well fed, will have increased in weight, instead of losing by driving, say only ½ lb. each for every 1½ days they are so treated—say 250 lbs. at 5½ cents, is

13 75

172 25

In the other way.

Expense of driving the same distance, supposing it can be done in 16 days, which is more than 16 miles per day:	
Feeding for 16 days, 8 barrels per day, supposing it can be had on the journey at the average cost of \$2 50 per barrel.	\$320 00
Five drivers, at 60 cts. per day for wages, and finding,	48 00
Same for 4 days returning,	12 00
Owner's expenses, for self and horse, \$1 50 per day,	24 00
Loss in weight of hogs in driving 16 days, and the risk of losing some of them—put this down only at 6 lbs. to each hog, makes 3000 lbs. at 5½ cents.	165 00

569 00

Suppose the average distance in traveling from the west to an eastern market is 500 miles, the cost in driving 500 hogs would be,	2,845 00
The cost by steamboats, canal boats, and a rail road at 3 cents per ton per mile, would be, say,	861 75

Difference, \$1,983 25

This, of itself, would be a good profit on 500 hogs, and would enable the seller to reduce the price from \$5 50 to 3 50, or at most \$4 00 per 100 lbs.

A. B.

[The following extracts present all those portions of a much larger article, which will be generally interesting to readers in this country. The parts omitted merely furnish descriptions of particular lines of railway contemplated in England, and a general view of such improvements in Europe and America. The

facts stated in this review, (which seem to be unquestionable,) will serve to direct our attention to various sources of profit to our own projected railways, which have been scarcely thought of heretofore—and perhaps, may lessen, if not remove, the objections of many land holders to those improvements. The actual increase in the value of lands on the routes exceeding the anticipated increase—the vast increase of travelers caused by the reduction of expense and of time—the facilities for conveying live-stock—all are matters which apply with as much force to one or both of the two great improvements proposed to end at Richmond, as to the English railways referred to by the reviewer.]

From the Edinburgh Review.

IMPROVEMENTS IN INLAND TRANSPORT IN ENGLAND.

It is now two years since we called the attention of our readers to the great advancement which had been made in the art of applying steam-power to the important purposes of inland transport. We then foretold the rapid extension of this great instrument of social improvement; and subsequent events have amply verified our predictions. Rail road undertakings have been entered into with an avidity to satisfy the most ardent, and to create alarm in the more timid and cautious. In our own country, however, the number of checks on such schemes are sufficient to prevent the public from rushing into them with undue precipitation; and the danger rather is, that private and local interests may act as too great a drag on public enterprise, than that the latter principle should receive undue scope. A considerable portion of the property of the country, and more especially of that in land, has, in many instances, opposed serious obstructions to parties seeking legislative sanction for projected lines of rail road; and although, in some cases, such opposition has proceeded from sinister motives, or such as would not bear an open avowal, yet we must suppose that in the majority, the ostensible objections have been seriously and sincerely, though erroneously entertained. In the present article, we shall endeavor to show, not only that the principal objections so urged are unfounded in themselves, but that they are in direct opposition to the results of experience, and as much opposed to the real interests of the objectors as to the public good. We shall also briefly advert to the principal lines of communication recently undertaken, and to those which are in progress in other parts of Europe, and in America.

The opposition which railway companies experience in obtaining the necessary legislative sanction, proceeds, in the majority of cases, from the land holders, through whose lands the projected lines are to pass. Nevertheless it is demonstrable, that there exists no class of persons whose interests are more likely to be promoted by such improvements than those of the local proprietors. One ground of objection assumed by proprietors resident in the vicinity of projected lines of rail road, is the apprehended nuisance of the noise and smoke of the engines, and of the exposure of their premises to the intrusion of large numbers of passengers. The evidence produced before the committee of the House of Commons, on the London and Birmingham Rail Road, will show how unfounded are such objections.

Mr. Hardman Earle, a Liverpool merchant, was one of the most determined opponents of the Liverpool and Manchester Rail Road. His family had, at the cost of above £12,000 built a house, and laid out pleasure-grounds, through which the line of railway passes; and their opposition was founded partly on the apprehended injury and inconveniences arising from this circumstance. Mr. Earle, therefore, was very properly summoned as a witness before this committee, and the following is a part of his testimony.

'Have you experienced any inconvenience since the railway was constructed?—No inconvenience whatever has been experienced.

'Are the grounds infested by the people in consequence of the passage of the locomotive engine?—No.

'Is there anything offensive in it?—Nothing whatever.

'Is there any smoke?—None whatever.

'Is there any noise?—No; it is rather an object of interest to persons residing there.

'Are you able to say whether the inhabitants of other houses are annoyed?—I am enabled to say they do not consider them a nuisance.

'At the commencement of the undertaking were you a determined opponent to the measure?—Yes; my mother was a petitioner against the bill, and I appeared as evidence against it.

'From all that you have since seen you would no longer oppose the construction of rail roads?—Certainly not; from what I have seen my opinion is entirely changed.'

In fact the fuel burned is coke, which produces no smoke. The smoothness of the road, and its freedom from those asperities which exist on the best constructed turnpike roads, are such that the wheels move with comparatively little noise. But, in addition to this, the speed being almost three times that of common coaches, and more than seven times that of wagons, the noise is almost momentary. A train of wagons or coaches shoots pass with the speed of the wind, and the noise is scarcely perceived before it ceases; it cannot be heard on a still day at a greater distance than one hundred yards.

Another ground of objection, urged by landlords, is the apprehended depreciation of the value of the adjacent land. The facility of communication with the metropolis and populous towns is so obvious an advantage, that we cannot help expressing our astonishment that such an apprehension should for a moment be entertained. As those who could entertain an objection so unfounded are little likely to be accessible to the reasoning by which it might be refuted, we shall here confine ourselves to facts, and show that in every case, without a single exception, which has come under inquiry, the value of land adjacent to a successful line of railway has been considerably increased.

Mr. Pease, M. P., a director of the Stockton and Darlington railway, stated in his evidence, that he had been for ten years a director of that company, during seven years of which the rail road had been in practical operation; that he had closely observed its effects on landed property through which it passed, or which was adjacent to it, and that he had been privy to all the negotiations which had taken place between the rail road company and the proprietors from whom they had made purchases.

'Do you know whether the advertisements of letting farms or selling estates, contain any thing relating to the rail road?—It is invariably stated, either that the rail road passes through the estate or near to it; they consider it as an enhancement of the value of the property.

'Are you a land holder yourself in the neighborhood of the rail road?—I have one small estate, which it intersects into two equal parts nearly. It passes through the enclosure in which the homestead stands.

'Have you been benefited by the rail road passing through it?—I have; the cuttings are available as drains; the rent of the property is increased one-fifth. I let the farm, subject to its being given up on the rail road being made, and I have since received one-fifth additional rent.

'Do you know any instance of the reduction of rent, in consequence of a rail road passing through a farm?—I have made inquiries, but have not been able to meet with such an instance.'

The Stockton and Darlington railway was originally intended to be a single line; but after its formation the company found, from the extent of traffic upon it, that a double line would be necessary. Having originally purchased no more land than was necessary for the single line, they were obliged to treat with the same proprietors for an additional tract to widen the road, so as to receive the second line of railway. Nothing can more conclusively decide the question of the effect of the railway on the value of land than this circumstance. Here was a portion of land, purchased before any railway had been constructed; and an equal quantity, in precisely the same place, was subsequently purchased from the same parties by the same company, after the formation of the single line of railway. Mr. Pease was examined as to the terms on which the second portion of land was purchased.

'Have you paid on those (second) treaties, an increased value upon the land beyond what you paid before the line was established?—Invariably.

'Can you say to what amount?—I should say that we have never objected to pay an advanced price of 50 per cent.

'Was this in consequence of the increase of value arising from the rail road?—We were quite aware of the increased value to the owner, and made no objection to the advance.'

Mr. Thomas Lee, a surveyor and agent to several landed gentlemen in the neighborhood of the Liverpool and Manchester Rail Road, was examined as to the effect of the rail road upon the value of land in that neighborhood.

'Can you tell the committee whether in an agricultural point of view, property has been improved or deteriorated by the rail road passing through it?—It has been improved.

'Have the farmers been benefited by it?—They have.

'Have Colonel Lee and Mr. Trafford obtained higher rents in consequence of it?—They have.

'Have you taken land yourself at an increased rent?—At double the original rent.'

Mr. Hardman Earle, before mentioned, was examined to the same point.

'Do you know any instance in which the value of land has been affected by the railway?—I think the Chat Moss was an instance of that kind. They bring manure from Manchester to Chat Moss; and wherever a station is formed, the value of the land is improved. You see advertisements recommending a site, because the rail road runs near or through it.

'Do you know of any instances by which land has been depreciated by it?—I think I can say positively that there is not an instance on the Manchester line.

'Do you know of any person quitting their dwelling-houses in consequence of it?—I do not know of one. I should be glad to purchase land on the line, to build for myself.'

We may here state that the Chat Moss is an extensive district of bog and morass, over which the rail road was carried at incredible labor and expense. It was of course previously altogether unproductive. We now, however, see on each side of the road extensive systems of drains, gradually carrying off the water, and leaving tracts of considerable fertility. There is no doubt that within a very short period the whole of this morass will be transformed into a fertile tract of arable land.

Another ground of objection, is the injury likely to be produced to turnpike trusts. Even if the truth of this objection be admitted, it is not one of sufficient force to warrant the sacrifice of public benefit. A turnpike trust is, or ought to be, held only for the public good; and if it should be affected by the establishment of a rail road, this would only prove that the one was found more beneficial than the other. But it is a curious fact, that this apprehended injury has not (at least in every instance) ensued. The Stockton and Darlington railway furnishes a remarkable example to the contrary.

Mr. Pease states in his evidence that the turnpike roads in the neighborhood of that railway have been improved since its construction.

'Has there been any advantage derived to the roads in the neighborhood?—I consider that they are all of them in a much better state of repair, and that their funds are improved; I do not know a single exception.

'Do you know the road from Stockton to Barnard Castle?—Perfectly well; I have been a commissioner. In that trust there are two roads running nearly parallel with the rail road, and a third intersected by it.

'Were the trustees of these roads petitioners against the bill?—All of them.

'On what grounds did they oppose it?—That the money borrowed on mortgage was hazarded by the rail road.

'Have their fears been realized?—No; the funds in all cases are improved.

'You state that of your own knowledge?—Yes, as an acting commissioner.'

The advantages likely to arise to agricultural producers from the facilities of conveying their produce to market, as well as the reciprocal advantages derived by the consumers, were rendered apparent by the evidence of several farmers and graziers, and also of metropolitan butchers.

Mr. W. Meade Warner, an extensive farmer residing in Oxfordshire, stated, that he considered that if the rail road now proposed to be carried from London to Birmingham had been formed ten or fifteen years ago, it would have produced him an advantage of not less than fifty pounds a year. He considered that the whole system of farming grass land would undergo a change, owing to the new capabilities which would be conferred upon it, by the speed, certainty, and cheapness of the communication with the market. A different kind of produce, of a much better and more profitable quality, would be obtained from it.

'Are lambs sent to London from your neighborhood?—They are, principally on the road; but when too young to leave the mother for so many days as the road requires, they are sent by wagons. Not many, however, are sent by this way.

'Are you prevented from sending many lambs to market by the difficulties of the road?—We cannot send them so young as we would otherwise send them. It is of importance to send them early in the season, as the ewe would feed off earlier.

'If a rail road were established, would they be sent by you and the other farmers by that means?—No doubt of it.

'Do the same observations apply to calves as to lambs?—Exactly.

'Are the cattle much injured by being driven up?—Very much; incalculably.'

It is not merely views of policy that should lead us to seek for some improvement in the transport of cattle to the markets. The following evidence is addressed to the feelings of common humanity.

'Supposing that even the cost was increased of sending them by the rail road, would it be of advantage to the farmer to have them conveyed by that means, nevertheless, instead of driving them in the ordinary way?—Certainly; it would be a great advantage. Sometimes the poor things are driven till their feet are sore; and the effect of that is, that they are sold on the road for what they can get. It is often the case, that they drive many of them till they have not a foot to stand on.

'What price, in your opinion, would the farmer be willing to pay for the conveyance of his cattle to London by the rail road, instead of the present way?—If I paid double, I should still be a very great gainer. It is a very important thing in the saving of beasts and sheep, both as to the exposure and the nuisance they create on the public roads. Besides that, the cruelty and injury to the animals is beyond all belief.

'Do I understand you rightly, that you would prefer to pay fourteen shillings for transmitting your cattle by rail road, to paying seven shillings for the ordinary means of conveyance?—To be sure I should.'

Mr. Charles Whitworth, a very extensive farmer in Northamptonshire, was examined on the same points. He had seen cattle conveyed on the Manchester Rail Road, and stated that they came from the journey 'as fresh as if they were just off the field.' He stated, that in order to send the lambs to market, it was necessary to send the ewes a part of the way with them; and 'even then they were much injured before they reached London.'

The injury sustained by cattle coming to the London market, was further proved by Mr. John Sharp, an extensive butcher, residing in Mary-le-bone. He stated that he has been for forty years established as a butcher, and that he never failed to observe more or less injury sustained by cattle driven from a distance to London; that their value was considerably lessened, owing to the inferior quality of the meat, arising from the animal being slaughtered in a diseased state; that the animal being fatigued and over-driven, 'becomes feverish, and his looks become not so good, and he loses weight by the length of the journey and the fatigue.' He stated further, that even steam-vessels, where they could be resorted to, did not altogether remove this objection. Cattle come from Scotland by steam-vessels, and they are found in London to be in an unnatural state: 'they seem stupified, and in a state of suffering from fatigue.'

It is not merely the fatigue of travelling which injures the animal, but also the absence from its accustomed pasture. Mr. Sharp stated that the injury from this cause was more or less under different circumstances, but always considerable. In order to obviate this, a considerable portion of the meat supplied to the London market is slaughtered in the country, and it comes in this state, in winter, from distances round London to the extent of one hundred miles. In warm weather a large quantity of it is spoiled, and a still greater quantity is deteriorated by this mode of conveyance. The transport of calves and lambs from a distance greater than thirty miles, is altogether impracticable; and even from that distance is attended with difficulty and injury. To convey these and other live cattle from a great distance, not only speed, but evenness of motion, is indispensable. Now these two requisites cannot be combined by any other means than the application of steam-engines upon a rail road.

From the whole of the evidence, the fact appears to be indisputably established, that the supply of animal food to the metropolis is not only defective in quantity, but that it is of unwholesome quality—comparatively, at least, with what it might be, if the tract from which it could be supplied were rendered more extensive. But forcibly as the evidence bears on this species of agricultural produce, it is still stronger respecting the produce of the dairy and the garden. Milk, cream, and fresh butter, vegetables of every denomination, and certain descriptions of fruit, are supplied exclusively from a narrow annulus of soil, which circumscribes the skirts of the metropolis. Every artificial expedient is resorted to, in order to extort from this limited portion of land the necessary supplies for a million and a half of people. The milk is of a quality so artificial, that we know not whether, in strict propriety of language, the name milk can be at all applied to it: the animals that yield it are fed not upon wholesome and natural pasturage, but in a great degree on grain and other articles. It will not be supposed that the milk which they yield is identical in wholesome and nutritious qualities with the article which would be supplied, if a tract of land of sufficient extent for the pasturage of cattle was made subservient to the wants of the metropolis. Add to this, that inferior as must be, under such circumstances, the quality of the milk, there exists the strongest temptations to the seller who retails it, to adulterate it still further, before it finds its way to the table of the consumer.

Mr. Warner, already mentioned, stated that, great as the advantage of a rail road would be to graziers who supplied the London butchers, it would be of still greater advantage to dairy farmers.

'Have you ever had offers made to you to supply any part of London with milk?—I have; but have never been able to comply with them on account of the want of a conveyance.

'If there was a rail road, by which you could transmit milk, and thus avail yourself of such an offer, would it add materially to the profits of your farm?—There is no question that it would increase the profit at least 400 or 500 per cent. I have no doubt of it, on milk and butter.*

* This enormous estimate of the advantage is no Vol. II.—42

In the produce of the dairy and the garden, it is not merely by smoothness and ease of transport that a rail road would offer facilities. Articles of a perishable nature must be supplied to the consumer within a short period after they are taken from the soil. The speed of rail road conveyance being six or seven times that by cart or wagon, the consequence would be, that such articles would be supplied to the metropolis from a circuit with a radius six or seven times the length of that which now supplies them; and consequently the land which would become available for the metropolitan markets, would be from thirty-six to forty-nine times the present extent; supposing rail roads to diverge in all directions from the metropolis, and to be furnished with their usual ramifications.

In our former article on this subject, we attempted to show, by general reasoning, the immense benefits which would accrue, both to farmers and landlords, as well as to the inhabitants of towns, by carrying extensive lines of rail road through populous districts, connecting them with those places from which supplies of food and other necessities might be obtained. We showed that the factitious value which tracts of land immediately surrounding the metropolis and large towns acquire from the proximity of the markets, would be moderated, and a portion of their advantages transferred to the more remote districts; thus equalizing the value of agricultural property, and rendering it in a great measure independent of local circumstances. We showed, further, that the profit of the farmer, and the rent of the landlord, would be benefited by the reduced cost of transport, and that such benefit would be likewise shared by the consumer; in fact, that the advantages of centralization would be realized without incurring the inconvenience of crowding together masses of people within small spaces; and that the whole face of the country would be brought to the condition, and made to share the opportunities of improvement which are afforded by a metropolis, and by towns of the larger class. At that time, however, we had no specific evidence to adduce in support of our reasonings, so as to reach those minds which can only be influenced by a direct appeal to facts. The subsequent extension of railways has brought to light a body of evidence, so extensive, that our only difficulty lies in the selection of such parts of it as may not exceed our necessary limits.

The beneficial effects of the Liverpool and Manchester railway on the value of land in the district through which it passes, have forced conviction upon the minds of those who were the most conspicuous opponents to that project.

Mr. J. Moss, a director of the Manchester railway, gave the following testimony:—

'Is it contemplated to have a rail road between Birmingham and Liverpool?—It is quite arranged.

'Have you made application to the owners of land for their consent?—As far as our half goes.

'Have you found owners, on the line between Liverpool and Birmingham, to consent to the rail road there, who, nevertheless, opposed the Liverpool and

doubt founded on the supposition that dairy produce would maintain its present price;—an obvious error, but still the advantage would be very considerable.

Manchester line?—Several; among others, Lords Derby and Sefton.

'Did Mr. Heywood of Manchester oppose the Manchester Rail Road?—Yes.

'Did he afterwards complain of its not passing through his lands?—He complained very much of it.'

If the ill effects of its opposition, on the part of landed proprietors, to projected rail roads were limited to the injury which they inflict upon themselves, the public would have less reason to complain of it; but unfortunately other extensive injuries have been thus produced. The opposition by Lords Derby and Sefton to the Manchester railway bill, compelled the company to deviate from the line of road which they first proposed, and which Mr. Stephenson, their engineer, pronounced to be the best. That line must have passed through a part of the property of these noblemen, whose opposition would at that time have defeated the bill. The company were therefore compelled to select another line, which was not only much more expensive in the formation, but which has been since productive of consequences most injurious to the road, and to the interests of the company and the public.

The line which the engineer was compelled to adopt, imposed upon him the formidable enterprise of crossing Chat Moss; and involved the company in an enormous expense in forming a solid road over that extensive morass. This, however, was not the only, or the most extensively injurious effect: it became necessary to carry the line of road over an elevation, so that the moving power had to overcome a slope rising at the rate of one in ninety-six in both directions, and extending through more than a mile and a half in each case. We explained in our former article, the injury which such an ascent produces: to draw a load up a slope of this degree of acclivity requires an impelling power, amounting to nearly four times the power necessary to draw the same load upon a level; the consequence is, that either auxiliary engines must be kept constantly at the foot of the slope, or else the impelling engine must be constructed with four times the power necessary on the level, and with a proportionate increase of strength and weight. We may safely assert, that no circumstance connected with the Manchester railway has been a more fertile source of expense and inconvenience than this occurrence. But if any thing be wanting to demonstrate the mischief of the proceeding out of which this has arisen, it is the fact detailed in the evidence of Mr. Moss, that a second line of railway has been in contemplation, connecting Liverpool with Manchester; that this second line is countenanced and encouraged by these very noblemen, Lords Derby and Sefton; that it is to pass through their grounds, and, we presume, to take the very course which was originally contemplated by the present railway company, and from which they were driven by opposition.

'Has there not been a scheme for another rail road?—Yes.

'Is it to pass through Lords Derby and Sefton's land?—Yes; they both consented. They threw us back the first year by the opposition to our road, and we then lost such a line as we never could obtain again. Since this, they have both consented that the other line shall pass through their property.'

Other proprietors, however, more speedily learned their error, and actually made interest to get the line through their property.

'Do you know Bold Hall?—Very well, it is a fine house.

'Is it near Liverpool and Manchester?—Yes; the proprietor complained very much, that we made a complete bend, to avoid his property.

'Did he afterwards wish you to cut off the bend, and go nearer by a straight line? Yes; and we agreed to go much nearer to his house.'

Besides the permanent advantages to land by opening large markets for every species of vegetable, animal, and mineral production, railways are attended with a variety of subordinate benefits, which, though they may appear inconsiderable, when compared with those already mentioned, yet ought not to be wholly disregarded. Among these may be mentioned the extensive employment of the local population, in a work in which by far the greater proportion of the labor is of a rude kind; likewise the purchase of materials of various kinds from the adjacent land owners. It was proved that on the Stockton and Darlington railway, as well as on other similar works, large sums were paid to the land owners for gravel, timber, and stone, for materials for bricks, and for various other purposes, independently of the land purchased from them. It was also proved that a very large proportion of the poor rates of the parishes through which railways pass are paid by the railway company. The Manchester railway company, for example, contribute not less than £4000 per annum to the poor rates of their parishes.

Mr. Pease stated that more than half the entire rates of several of the parishes through which the Stockton and Darlington railway passes, are paid by the railway company. But in addition to this, the actual amount of rates is lessened by the extensive employment afforded for labor on the railway. Mr. Lee stated, that of the poor rates in the parish of Newton, one-fourth part was paid by the Manchester railway company.

The speed of transit, and the consequent frequency of communication between places of great commercial intercourse, are matters, the importance of which can scarcely be overrated in this country. The time between Liverpool and Manchester, being a distance of about thirty-one miles, is now about an hour and a half; there are three deliveries of letters by post daily between these two places; so that two letters may be written and one answer received by the same correspondents in the course of a day. The frequency of communication might be still greater: nine trains of coaches start daily from each place, and if it were necessary, there might be nine deliveries in each town. When the lines of railway from London to Birmingham, and from Birmingham to Manchester, shall have been completed, the time from London to Liverpool will be about eleven hours; the mail which leaves London at eight o'clock in the evening, will therefore be delivered in Liverpool before nine the following morning. The time between London and Birmingham will be five hours and a half; there will probably, therefore, be two mails daily. The letters despatched from London at eight o'clock in the evening would be delivered in Dublin the following evening. From some improvements which are

in progress in the steam-packets, it appears that, under average circumstances, they may be depended on to make the voyage from Liverpool to Kingston (near Dublin) in ten hours: the mail which would arrive at Liverpool at seven in the morning would therefore be at Dublin at six in the evening, so that the Dublin merchants could answer their London letters the same night. It would, therefore, be possible that an answer to a letter from London to Dublin could arrive in London in about fifty hours after the despatch of the letter.

In the evidence of Mr. Moss we find a striking instance of the preference given by the public to rail road conveyance.

'Do you know whether there are some places on the line from Liverpool to Manchester where persons go down a considerable distance to come to the rail? Yes; Southport is an example. This town is 38 miles from Manchester, and 25 from Liverpool. Persons going to Manchester prefer to come the 25 miles to Liverpool, and 30 along the rail road, making 55 miles, to going 38 miles by the direct road to Manchester.

'Do they do that with a saving of time and expense? They save both time and expense.

'Being aware of these facts, and knowing the projected line between London and Liverpool, are there many places from which persons would come to the rail road, for the purpose of going to London, rather than take the direct turnpike road? Yes; all places in the manufacturing part of Yorkshire, such as Bradford, Halifax, and Leeds; they would come to Manchester, and there take the rail road.

'What would be the saving from Leeds? It would be 40 miles round; but it would save four hours in time, and £1 in money.

'What would be the saving from Rochdale? Ten hours in time, and 30s. in money.'

A large portion of the time of those farmers and graziers, living at a distance from London, who are obliged to attend the London markets, is consumed in making the journey. Mr. Robert Attenborough, a farmer and grazier residing at Braybrook, eighty miles from London, stated that his business obliged him to attend once a week at Smithfield market; that it takes him three days and a night, travelling at night, to go up to London, do his business, and return; that he seldom gets home till four o'clock on Sunday morning; and that a like inconvenience is sustained by the other farmers and graziers in his neighborhood: that besides the expenses on the way, the fare of the coach is £3 4s., and that the sacrifice of his business at home is the consequence of his journeys to London. A rail road would take him to London in about four hours, and starting in the morning he could arrive at home at a reasonable hour the same night.

By the evidence of other witnesses it appeared that a saving to a very large amount has been made by houses of business in Manchester, since the establishment of the railway, in their agencies alone. Some notion of the extent of this may be formed, when we state that several houses have saved £500 a year in this item of expenditure.

The advantage of the increased speed and cheapness of communication obtained by railways, worked by steam-engines, is not confined to the saving of the time and money of those who are compelled by business, or induced by pleasure, to travel. Vast numbers, who, under other circum-

stances, would remain stationary, find it for their advantage to avail themselves of the opportunities of intercourse with distant places thus opened to them. It appears by the evidence of Mr. Booth, that before the establishment of the railway between Manchester and Liverpool, there were about twenty-two regular coaches running between these places; these coaches were licensed to carry about 700 persons; and taking them at their average number, they may be estimated as having transported 450 persons daily between these two towns. The inside fare was ten shillings, the outside six; and the time of the journey varied from four hours to four hours and a half. The fare at present, on the rail road, by the first class train, is five shillings and sixpence, and by the second class, three shillings and sixpence; being about half the fare by the coaches; and the time of the first class an hour and a half, and of the second class two hours; being less than half the time occupied on the turnpike road. The number of passengers between the two places in the six months ending in December, 1833, was 215,071 booked; to which if we add 5,000 for the passengers taken up on the road and not booked, we shall have a total of about 220,000: if we divide this by the number of days in the half-year, we shall find that the average daily including Sundays, was 1,209. It appears, therefore, that the number of passengers between these towns has been tripled since the establishment of the rail road;—in other words, about 800 persons daily, who have occasion to pass between the two places, but who were before prevented from doing so, either by reason of the time or expense of the turnpike road, are now enabled to perform the journey.

The ill effects of the slopes on the Manchester and Liverpool railway have impressed on engineers the indispensable necessity of avoiding them, or rendering them as gentle as possible in future undertakings. This object will be attained in a great degree on the Birmingham and London line, but at an enormous expense. The country through which it will pass is of an undulating character, so that there is scarcely a mile of the road in which either cuttings or embankments will not be necessary. Where the elevations to be encountered are inconsiderable, a level is obtained by forming a chasm in the crest of the hill, and using the stuff removed from it to form an embankment in the valley; but there are numerous elevations along the proposed line of road, which either from their great height or other causes, render this method impracticable. In such cases the level of the road will be maintained by penetrating the elevations by tunnels. Of these structures eleven were proposed in the parliamentary plan; but it is probable that cuttings will be substituted for some of them as the work proceeds, and that the actual number will not exceed eight: the largest will be constructed at Kilsby, near Daventry, seventy-seven miles from London; it will be about a mile and a half in length. Another, situate about two miles beyond Watford, will be a mile in length. That which will pass under Primrose Hill, and under the roads leading from the Regent's Park, and from St. John's Wood to Finchley, will be half a mile in length: one near Weedon will be three quarters of a mile long, but

none of the others will exceed a quarter of a mile in length.

The principal obstacle to the adoption of tunnels on railways, worked by steam power, has been the want of sufficient ventilation. The furnace of the engine soon renders the air unfit for breathing, and the impurity produced by the passage of one engine might continue until the arrival of the next. It is proposed, in the longer tunnels, to overcome this difficulty by providing shafts or chimneys at short intervals, carried from the roof of the tunnel to the surface of the ground above. In the case of the long tunnel at Kilsby, some of these shafts will be one hundred feet high; in the other tunnels they will vary from thirty to seventy feet; all of them will be eight feet in diameter. We are not aware whether the sufficiency of such an expedient for the purposes of ventilation has yet been ascertained by experiment. It has been stated that the speed with which the engines will traverse the tunnels will be so great, that very little ventilation will suffice. But the ventilation necessary for the tunnel will be the same, at whatever speed the engine may proceed; for the air drawn through the fire during the passage of the engine will be the same whatever the speed may be. Each stroke of the piston will draw through the fire the same quantity of atmospheric air; and it is obvious that the same number of strokes of the piston will produce the same number of revolutions of the wheels, and therefore the same progressive advance of the engine at whatever rate the piston may move. If the engine moves rapidly through the tunnel, it will, therefore, still vitiate the same quantity of atmospheric air; but there will be this convenience, that the passengers will not be detained in the air so vitiated any considerable length of time. The longest tunnel upon the projected line will be traversed in less than five minutes, and the shafts will subsequently remove, though perhaps not very speedily, the impure air.

In cases where it is not found practicable to traverse the valleys by embankments, bridges to support the rail road, of great extent, have been projected, by which the valleys may be arched over. One of the most stupendous of these works is the viaduct intended to bestride the valley of the Ouse. This work, which will be situate between Newport Pagnel, and Stoney Stratford, will cross the valley of the Ouse about a mile and a half eastward of the latter town; its extreme length will be a mile and a quarter, and the height of the level of the rails at the centre arch above that of the water will be nearly fifty feet; the centre portion will be supported on seven magnificent arches, each of fifty feet water way; the key-stone of each arch not to be less than twenty-five feet above the surface of the ground. The extreme ends of the viaduct will be formed by embankments. By such gigantic efforts of labor and skill, the inequalities of the ground will be greatly diminished, though not absolutely overcome. * * *

THE FENCE TAX.

To the Editor of the Farmers' Register.

The enclosing fence of one mile square will cost, in this part of the state, if made of good materials, two thousand dollars—and good the materials must be, if they last 20 years. The interest

upon this sum is \$120, and the annual waste \$100, making the sum of \$220 per annum for a certain charge upon that much land, for no other real or pretended purpose, than to make the contents of the enclosure legally the owner's. And even then, sir, he has but colorable pretence to be the owner; for such has been the demoralizing effect of the enclosing law, that those who live upon the common, can and will find their way in—and that in such a way as to leave you without a remedy.

If, sir, you give men a right to enter your kitchen, how long will they be kept out of your pantry, if they are hungry and have winded the scent of roast and stew? The beasts of the field have not, like man, an imaginary moral restraint: they, without craft, go for all they can get—and, having the legal right to try every pannel, they must be lower in rank than "poor shoats" if they fail; and without intending more than to do sheer justice to this case, I will ask how long the owner would refuse to give them his aid? No virtue, sir, will resist cupidity, if you make it legal to pass the outer barrier. Appetite has no moral law.

I would ask our political economists if they could guess why land is so low, and so much neglected in Virginia? Poor Virginia! how long will thy children hang mill stones upon thy neck? How long will they keep thee ragged and naked? Yet thy very name is a blessing to thy children.

This rent charge of \$220 upon every 640 acres of land is what every purchaser must add to the sum he pays for land before he can say what the real cost is; and it may be fairly said, that every landholder pays that sum for being legislated into common. Can we be forever blind—forever lawless? If my brother farmers would give this subject its due share of consideration, I am persuaded, it is far more important than the making of a president—for, make who they may, the crafty only will divide the spoils.

X. Y. Z.

Fairfax County, 13th Jan., 1835.

From the Petersburg Intelligencer.

REPORT ON THE MODE AND ADVANTAGES OF IMPROVING THE NAVIGATION OF THE UPPER APPOMATTOX.

Agreeably to notice published in the Richmond Enquirer, the Constitutional Whig, and Petersburg Constellation, a meeting took place in the town of Farmville, on the 2d January, 1835, for the purpose of taking into consideration the navigation of the Appomattox river by the lock and dam system, from Petersburg to Farmville, and by the jettee and sluice dam system, from Farmville to Planterstown. On motion, Thomas A. Morton was called to the chair, and Henry Brazeal appointed secretary of the meeting. N. E. Venable was requested to read the report of the engineer employed by the Board of Public Works, which report was accordingly read. Whereupon the following plan for improving the navigation of said river was submitted for consideration, to wit:

It is proposed to improve the navigation of the Appomattox river, by locks and dams, from Farmville to the head of the canal near Petersburg, so as to give two feet depth of water at all seasons of the year; and by jetties and wing dams from Farmville to Planterstown, so as to

give one and a half feet depth of water the greater part of the year. With a view to this improvement the Board of Public Works has had a survey of the river made by a competent engineer, who has reported favorably of the above system of improvement, as best suited to the river; and states the cost of the whole work at \$84,984 90. It has been thought by some who have examined the report of the engineer, that the estimates are larger in amount than necessary; but as estimates of such works are rarely too high, it will be safe to take the estimates made as the basis of the calculations to be made in applying to the legislature for an act incorporating a company to do the work. It remains to show how the capital is to be raised to complete the work.

It is proposed (with the consent of the Upper Appomattox Company) to obtain an act of incorporation for a company to improve the river by locks and dams from the head of the canal to Farmville, and by jetties and wing dams from Farmville to Planterstown, with a capital of \$85,000.

2d. That this company, on the completion of the work to Farmville, be entitled to receive tolls on all articles passing the river, equal to, and the same with, the tolls received by the Upper Appomattox Company with the exception of wheat, flour, and plaster of paris, and to receive on wheat and flour half the present tolls, and on plaster of paris no toll: provided, that the profits of said company shall not exceed 8 per cent. per annum after paying the annual necessary expenses, and provided that the rights of the Upper Appomattox Company be no way affected by the charter of the new company.

To make it evident that the above propositions are reasonable, and the improvement practicable, it is only necessary to review the present state of the trade on the river, and the probable increase, in case the improvement shall be made. The tolls on the present trade, which average about \$5000 per annum, will pay a dividend of about 6 per cent. on the proposed capital, leaving the income on the water privileges which will accrue to the company, to pay the annual expenses. It is believed however that a constant navigation of two feet depth will increase the tonnage of the river fourfold: this if it should be realized, will have the effect to pay the stockholders 8 per cent per annum and reduce the tolls to a very low rate; add to this the fact, that the improvement will lessen freights, to an amount equal to three times the toll levied on the produce. Independent of the great advantages of reduced freights, the certainty of this channel of trade will cause it to be used almost entirely by the people of the country south-west of Petersburg, both for imports and exports. When this is the case it may well be imagined that the amount of tonnage will be great as the most of the products, for export and imported articles of consumption, for the counties of Amelia, Powhatan, Cumberland, Nottoway, Prince Edward, Charlotte, and a portion of the same articles, from Chesterfield, Buckingham, Lunenburg and Mecklenburg, will pass through this channel.

The present freights from Farmville are as follows:

Tobacco \$3 50, toll 42 cents—total, \$3 92 per hhd.

Wheat 12 cents per bushel, toll 2 cents, total 14 cents.

Other articles in proportion.

Back loads are brought for 25 cents per hundred pounds.

Under the new system.

Tobacco would be, freight \$2, toll 84 cents per hhd.—total \$2 84.

Wheat, freight 6 cents, toll 3 cents, total 9 cents.

Other articles in proportion.

Back loads would be brought for half the present rates.

Thus it will be seen, that the saving in expense alone would be more than double the present toll, and the certainty of the way to market would be a still greater advantage to the agricultural interests and trade of the country.

After the report of the engineer and the above specified plan were duly considered, on motion it was resolved, That James Madison, N. E. Venable, William Willson, John Miller, H. Brazeal, J. R. Palmore, Thos. A. Morton, or any three of them, be and they are hereby appointed a committee, who are authorized and required to draw up a memorial, and cause the same to be presented to the legislature, embracing the plan and estimates of tolls and dividends which are embodied in the statement which has been submitted as above.

Resolved, That the committee aforesaid be required to embrace in the memorial, the following, to wit—That in the event of the legislature chartering a company for effecting the navigation upon the plan aforesaid, that the company be authorized from time to time to cause an inspection of the locks of the mills now on the river, and should they find any of the said locks at any time in an unsafe and doubtful condition, they shall give notice to the owners or occupiers of the mill, and unless said owners or occupiers shall in— months cause the said locks to be put in good condition for the speedy and convenient passage of boats, then the said company shall be authorized to cause it to be done, and to collect or receive the cost thereof from the owner or owners of such mills.

Resolved, That the proceedings of this meeting be published in the Richmond Enquirer, the Constitutional Whig, the Petersburg Intelligencer and Constellation.

Resolved, That so much of Mr. Conty's report as concerns the contemplated improvement be published with the above proceedings.

On motion, the meeting adjourned.

THOMAS A. MORTON, *Chairman*.

Report of the Engineer.

Richmond, Dec. 22, 1834.

Gentlemen—Having been appointed by your honorable board, to execute an act of last session of the legislature, the object of which was the "survey of the Appomattox river, from the town of Petersburg, to the highest practicable point of navigation, and make an estimate of the costs of improving the navigation thereof, by locks and dams, jetties, or wing-dams, or a combination of the three modes of improvement, so as to give at least two feet depth of water from the town of

Petersburg to the town of Farmville, at all seasons of the year," the following report is submitted:

About the middle of July last, I proceeded to the town of Farmville, and commenced the survey, extending it up the Appomattox to the South Fork, a distance of $38\frac{1}{2}$ miles, with a fall of 243.69 feet. The present charter of the Upper Appomattox Company extends to Planterstown, a distance of $22\frac{1}{2}$ miles, with a fall of 96.15 feet, averaging 4.9 feet per mile; the remaining 16 miles has a fall of 175.54 feet, averaging upwards of 9 feet to the mile. The great fall in this portion of the river, and the very considerable expense attending its improvement, induces me to think that Planterstown is as high a point as the company's attention should be directed for the present. Therefore, the estimate of expense extends no further.

The principal obstructions between Farmville and Planterstown, are the number of shoals, many of which are gravel, difficult to improve, and uncertain of remaining so; in reaches of the river free from shoals, the navigation is materially injured by the number of trees and logs, occasioning an accumulation of sand and diffusing the water over its bed, so that no sufficient depth can be obtained until the removal of such obstructions. Jetties may be beneficially applied in such places after the removal of logs, &c. Wings with side dams should be used in the improvement of shoals. By throwing the quantity of water into a body, and retaining it between the side dams it secures a more regular depth and prevents any accumulation of gravel, &c. By the application of jetties or wing dams to a shoal of considerable length, a sufficient depth may be obtained between the jetties from the construction of the current; but when allowed to spread, it loses its scumming property: a deposit takes place between the former and lower jetty, which proves injurious to the navigation. By proper application of jetties, wing and side dams, the removal of logs, gravel, &c. a navigation of 18 inches in depth may be obtained to Planterstown, the greater part of the year.

The fall of the river from Farmville to the head of the canal in Petersburg is 180.26 feet, and distance 90 miles 497 yards. The act of the legislature calls for not less than two feet depth of water at all seasons of the year. During the survey the quantity of water was measured in several places, and found inadequate to furnish the depth called for by the act. The improvement of a river by jetties, wings and side dams, is a very uncertain and imperfect mode; much money may be expended, and the winter floods may cause a renewal of the same expense if this method is persisted in. The improvement of the river Clyde, in Scotland, was commenced first by jetties, which were abandoned, then by contracting the current by parallel walls of stone thrown in promiscuously, besides the great expense in the use of the dredging machine. Yet, late accounts attest the imperfection of this system of improving rivers, and the navigation has been much impeded by the frequent formation of obstructions.

Being satisfied that the best mode of improving the Appomattox from Farmville down, and furnishing the called for depth, can only be obtained by a system of dams and locks; particular regard has been had in placing them in such situations, both for security to the works and to occasion as little damage as possible by their overflowing the ad-

joining low grounds. The elevation of the proposed dams, are from 1 foot in height to 6 feet. From this arrangement no apprehension need be entertained of much injury by overflowing, and those low grounds at the dams, may be successfully drained by passing round and discharging the water below. The situation of the dams are most generally at the head of the shoals with a view of obtaining a good foundation and the least possible height. The entrance of the canals (for the safety of the boats) are a short distance above the dams, and communicating with the river at the lower end of the shoal, when the locks are made more secure by being protected from the current of the river, and constructed at less expense than if connected with the dam.

Particular attention should be had to the cutting down and removal of the trees on the banks of the river; they are numerous, with their branches frequently interwoven across the stream. The locks at Venable and Stony Point Mills require renewal; much delay and loss is sustained by the imperfection of these locks during a drought.

The sill of the lock at Exeter Mills cannot be more than four inches below the surface of the water during a low stage of the river, therefore, it becomes useless. During a high freshet in the river, the head gate cannot be opened, causing a detention of several days to the boatmen. The locks at Clemingtown appear to be in good condition, and are constructed on the best principle of any between Farmville and the head of the canal.

Estimate of the probable expense of improving the navigation of the Appomattox river from the town of Farmville to Planterstown by jetties, side and wing dams, \$10,276 20.

Estimate for completing a two feet depth navigation of the river Appomattox between the town of Farmville and the head of the canal at Petersburg \$74,708 70. By building the locks of stone laid in water-proof cement, and including the lockage at the several mills, it would increase the amount to \$152,000.

JOHN CONTY.

To the Board of Public Works.

From the Horticultural Register.

VINEYARD OF CLOS DE VOUGEAUD.

In the middle and northern departments of France, and in the vineyard culture, the vines are kept low, like plantations of the raspberry, the vines being planted in close order; or they are trained to low stakes, which are renewed every year. When the vine has risen to a height sufficiently above, it is bent over, and passed to the top of the next stake, and secured in its rear; its luxuriance being thus restrained.

The same system of restriction is practised at the *Clos de Vougeaud*. This is regarded as the best vineyard in France, and was sold during the revolution, and in 1794, for one million one hundred thousand francs. This vineyard is walled round. The vines being kept low, and the ground never manured. The soil is calcareous, on a foundation of limestone or calcareous rocks.

DIARY OF THE TEMPERATURE AND STATE OF THE WEATHER, FROM OCTOBER 1, TO DECEMBER 31, 1884.—OBSERVED AT FORT MONROE.

OCT.	THERMOMETER.			WINDS.	WEATHER	NOV.	THERMOMETER.			WINDS.	WEATHER	DEC.	THERMOMETER.			WINDS.	WEATHER						
	VII. A.M.	II. P.M.	IX. P.M.				VII. A.M.	II. P.M.	IX. P.M.				VII. A.M.	II. P.M.	IX. P.M.								
1	70	75	73	S.	fair.	1	60	64	62	N.E.	cloudy.	1	45	58	57	S.	fair.						
2	72	77	75	S.E.	rain.	2	59	62	60	N.	"	2	59	62	54	N.E.	rain.						
3	80	73	73	"	cloudy.	3	59	61	59	N.E.	fair.	3	52	50	46	S.E.	cloudy.						
4	72	78	74	S.W.	fair.	4	53	60	58	S.W.	"	4	32	49	47	S.E.	rain.						
5	70	68	66	N.	"	5	57	61	59	S.	cloudy.	5	38	50	49	S.W.	rain.						
6	66	67	66	S.E.	"	6	57	56	53	N.	fair.	6	48	60	58	S.W.	fair.						
7	68	70	69	"	"	7	51	59	57	N.E.	"	7	47	58	56	"	"						
8	69	72	70	S.	cloudy.	8	56	61	57	E.	"	8	54	62	55	N.	"						
9	70	75	69	S.W.	"	9	55	60	58	W.	"	9	84	68	85	S.W.	"						
10	63	63	61	N.	fair.	10	57	63	59	S.W.	"	10	82	46	42	"	"						
11	61	62	62	"	"	11	58	60	58	W.	"	11	88	56	44	"	"						
12	63	72	68	E.	"	12	57	62	60	S.	"	12	88	47	42	"	"						
13	67	69	62	N.	cloudy.	13	57	63	61	S.E.	"	13	39	52	52	"	"						
14	55	67	57	"	fair.	14	59	64	61	S.W.	"	14	46	49	35	N.W.	cloudy.						
15	59	64	62	"	"	15	58	60	56	N.E.	rain.	15	26	44	42	N.	fair.						
16	61	68	65	N.E.	"	16	52	56	50	"	"	16	40	50	46	N.E.	"						
17	64	69	67	S.	"	17	49	60	49	"	"	17	43	40	41	"	cloudy.						
18	66	70	72	"	"	18	48	51	48	N.W.	fair.	18	42	43	43	N.	rain.						
19	69	59	56	N.	rain.	19	46	50	48	N.	"	19	44	50	48	"	cloudy.						
20	55	55	53	"	fair.	20	47	52	54	"	"	20	48	55	51	"	"						
21	52	57	55	S.	"	21	46	54	52	S.	"	21	40	52	50	N.E.	"						
22	54	60	63	"	"	22	50	56	52	"	"	22	50	57	55	N.	"						
23	59	65	63	"	"	23	47	49	44	N.	"	23	48	54	53	N.E.	"						
24	62	64	63	S.W.	"	24	40	42	36	"	"	24	45	50	48	"	"						
25	62	66	60	S.E.	cloudy.	25	37	37	35	N.E.	"	25	49	43	41	"	"						
26	59	63	59	N.W.	fair.	26	32	40	45	N.W.	"	26	36	35	34	N.	rain.						
27	63	70	67	S.	"	27	42	50	47	E.	"	27	31	36	35	N.E.	fair.						
28	60	68	65	S.E.	cloudy.	28	45	52	51	S.E.	"	28	36	40	39	"	rain.						
29	63	67	64	W.	fair.	29	50	56	54	S.	cloudy.	29	42	43	41	"	"						
30	68	65	61	N.E.	"	30	56	62	61	W.	fair.	30	40	44	42	N.W.	fair.						
31	69	62	58	S.W.	"	31	48	59	49	"	"	31	40	44	40	N.E.	"						
Total No. of degrees.						Total No. of degrees.						Total No. of degrees.						Total No. of degrees.					
1976						1639						1692						1892					
2062						1670						1692						1488					
1996						1670						1692						1488					

ABSTRACT FOR THE QUARTER.

MONTHS.	THERMOMETER.										WINDS.										WEATHER.			
	Highest degree.			Lowest degree.			Mean temperature																	
	VII.	II.	IX.	VII.	II.	IX.	VII.	II.	IX.	IX.	N.	N. W.	N. E.	E.	S. E.	S.	S. W.	W.	Prevailing.	Days.	Fair.	Cloudy.	Rain.	Snow.
OCTOBER.	80	78	75	52	55	53	63	67	64	3	9	1	2	1	5	8	4	1	N.	23	6	2	2	
NOVEMBER.	60	64	62	32	37	35	50	55	53	1	7	2	7	2	2	4	3	3	N. E.	23	4	3	3	
DECEMBER.	59	62	55	26	35	31	42	49	46	2	9	2	11	2	1	2	6	3	N. E.	14	11	6	6	
																			Prevailing.	Days.	fair.	fair.	fair.	fair.

ON THE MANNER AND TIME FOR SOWING CLOVER SEED.

To the Editor of the Farmers' Register.

In consequence of my reading an ingenious article in the first volume of the Register, (page 566,) on sowing clover seed, I was induced last spring to try one of the experiments therein recommended. Three beds extending quite through a large field were harrowed previously to their being sown. Two of them were rolled after the seed had been applied—the third not. Between these beds I observed no difference. I cannot therefore say whether or no the rolling would generally be of any use. Perhaps it may have been owing to the subsequent state of the weather that no difference was perceptible. Theoretically, I should certainly prefer rolling, for the sake both of the wheat and the clover. Between the three beds, however, and the land on each side, there was a striking and gratifying difference during the whole year. They could be traced after harvest, with the eye, at the distance of several hundred yards, by their superior verdure and luxuriance, throughout their whole extent. A nearer inspection showed that they were much more thickly set than the neighboring beds, on which the same quantity of seed had been put. The success of the experiment is as complete as can be inferred from a single trial: to me it is conclusive. I think an important consequence may be deduced from this plan that did not occur to its author—I mean the estimated saving of one-fourth of the usual quantity of seed, with greater certainty of success, and regularity of distribution, than in the common way with the more liberal allowance. It needs but little reflection to form some idea of the immense advantage that would thus result to an extensive region for which nearly the whole supply of this article has to be purchased from a distance. The ordinary mode of sowing clover seed on a hard surface, and then leaving it uncovered to take its chance, is liable to many objections. Much seed is lost: it is irregularly distributed—the plants frequently growing in bunches, and not unfrequently failing altogether. But little land is so neatly prepared as not to have numerous inequalities. The seed is liable to roll, or be washed into the small cavities or depressions, while the eminences are either not at all, or only scantily supplied; and the few seeds that may remain and vegetate in those situations, are exposed to injury from drought or frost, or both. By previously harrowing, the seed sticks where it is deposited; and even if not rolled, it soon gets covered by the settling of the loose earth, from rain and other causes.

I have taken some pains to learn the opinions and practice of intelligent farmers in regard to the management of clover seed. The result of these inquiries, briefly stated, may not be uninteresting. One gentleman, as remarked before, sowed a certain amount of seed on a hard surface, and then rolled it, whose

who is very observant, and keeps an accurate diary, sows the clean seed from boxes, with small holes in different places to regulate the quantity, during a cold spell in February, or if it does not come in February, in March, (for he says it always will happen in one month or the other) and never applies the plaster till the second spring, in order to avoid the rust in his wheat, to which malady he thinks it is rendered more liable by the use of that mysterious mineral. The method of a fourth gentleman is to mix three bushels of plaster with one of seed, and to sow at first half the quantity intended to be applied, going over the whole ground, then returning to the place of commencement and sowing the residue, so that the ground is twice sown over to insure greater regularity, and at two different periods, to afford a better opportunity of escaping destruction by frost; the full quantity of gypsum is afterwards applied when the clover plants get in the third leaf. The opinion of the writer of this article is in favor of sowing from the 25th of January till the 20th of February, taking all circumstances and seasons into consideration. By harrowing the land, and still better, I presume, by rolling also, clover may doubtless be sown with perfect safety, considerably earlier and later than the period above specified. It may be useful here to state that some sensible and successful farmers consider a bushel of plaster and ashes mixed in equal quantities, as beneficial as a like measure of the former article alone, and of course, much cheaper, especially in the interior, where to the first cost of the commodity is to be added the cost of carriage.

A PLANTER OF THE LOWER JAMES.

January, 1835.

For the Farmers' Register.

ON THE PROPRIETY OF CORRESPONDENTS
SIGNING THEIR PROPER NAMES.

—"What is't you seek?
Your names!"

It is in my humble opinion extremely important that every correspondent should subscribe his proper name to every communication made to this journal—more particularly when they contain any specific facts, or experiments. The papers, which are published in this, or any other scientific journal, without "a local habitation and a name," are of little or no value. It is important, and very desirable, to have attached to every communication the actual name of the author, and the county and state in which he resides, or his observations or experiments may have been made. The reasons are obvious to all. In the first place, it is necessary to have a responsible name for every fact or experiment, which may be stated. It matters not whether the individual be known to fame or not, he should be known to fame or not by his name, and should forth with his opinions, and his experiments, in. Secondly, in agriculture, it is necessary to have a responsible name for every fact or experiment, which may be stated. It matters not whether the individual be known to fame or not, he should be known to fame or not by his name, and should forth with his opinions, and his experiments, in. Secondly, in agriculture, it is necessary to have a responsible name for every fact or experiment, which may be stated. It matters not whether the individual be known to fame or not, he should be known to fame or not by his name, and should forth with his opinions, and his experiments, in.

son why the name should be published—that the carrying into practice of any new principles in farming is attended always with expense, and hence, it is important to know upon what authority you are justified in incurring any additional expense. It may often be attended with useful consequences, if the author were known, to correspond with him, and elicit additional information on the particular subject on which he has written.

For these, and other reasons which might be given, I would respectfully suggest to the editor of the Farmers' Register, the propriety of adopting the rule—not to publish any piece containing specific facts, without the author will attach thereto his proper name. No communication I venture to affirm, would receive the least countenance from an editor of any scientific journal without a responsible name. Look in any medical journal, as the Philadelphia Journal of the Medical Sciences, or in any periodical containing essays on chemistry, mineralogy, or any other scientific subject, and it will be found that they are not sent forth *sub nominis umbra*, by A B, or C D, or E F, but have attached to each communication the actual author's name. Why not, then, in the name of common sense will not every gentleman who can contribute his mite of agricultural information, send forth with it, his own name? Is it modesty which forbids? Surely there is nothing immodest in discoursing through this paper with plain farmers. Is it the insignificance of the subject? Certainly, no enlightened individual will treat any subject connected with the most important of all occupations, lightly or indifferently. Agriculture, may now be considered as having taken a rank among the sciences—and every subject connected with it should be treated with that gravity, dignity and respect, which properly belongs to it. On this subject (of the importance which should be attached to the name,) it would be well to imitate the English or French farmers. It will be seen in reading a British or French agricultural paper, that almost always the name is appended, or no value would be attached to the publication. Even in our New England agricultural papers the name of the author is generally given. Hoping that these suggestions will have some influence with future contributors to the Register, and wishing the editor all success in his undertaking, I subscribe my name.

PETER DE QUIR.

Matthews County, Va.

P. S.—Is it ever advantageous or proper to burn land? Is there any kind of vegetation which grows on our fields, that it would be more profitable to burn off than to plough under? Will the ashes produced thereby compensate for the loss of vegetable matter? Will not the crop be better the first year when coarse grass or broom sedge is burnt, than it would be if ploughed in? But will not the land be ultimately benefited in a greater degree by turning in such a cover? These I conceive, to be interesting and important interrogatories, and I hope the Editor, and those correspondents whose experience will enable them to enlighten their brother farmers, will not hesitate to do so *in propria nomine*.

PETER DE QUIR.

For the Farmers' Register.

COMMERCIAL REPORT.

The regular business of Virginia has been interrupted during the greater part of this month, first by a long continuance of rain which rendered the roads impassable, and subsequently, by a degree of cold hitherto almost unknown in our climate, which closed our rivers, and the navigation of them was suspended an unusual length of time.

These remarks do not apply to Norfolk, whose favorably situated harbor is always accessible, and owing to this cause, an unusual number of vessels have sought that port during the severity of the winter. This advantage combined with others which that port possesses, will always insure to it an important trade.

Whilst supplies of cotton were retarded by the causes above mentioned, nearly all the stocks of that article in Petersburg were sold at 15 to 16 cents—but the late accounts from England being less favorable than had been anticipated, the price has declined one cent per pound, and from present appearances will go yet lower.

Fortunately for the planters, a large portion of their crops was sold under the most favorable circumstances. The dealers in this article are divided into two parties. One of them estimates the crop to be *smaller*, and the other *larger*, than the preceding one; and among the former are the planters and speculators at the South, who now hold a large quantity—the facilities afforded by the banks enabling them to retain it on hand. The planters have been unusually industrious this season, for although the crop matured a month later than the last one, and is said by them to be less productive, they have brought to the various markets in the United States, upwards of 100,000 bales more than they had at the same period last year.

The manufacture of cotton is carried on to a greater extent than at any former period; but the spinners in England possess such an unlimited control of the market in consequence of their great command of capital, that they can check any considerable advance in the price whenever they think proper to exert their power; and thus whenever speculators in Europe extend their operations at a high price, the spinners leave the article on their hands, and a decline ensues. This has proved to be the case during the last two years, as well as in former instances, and it is thus that variations occasionally take place in foreign markets which deceive and mislead us in this country. Some months must elapse before the probable extent of the last crop can be closely estimated—but meanwhile the best informed persons generally estimate the aggregate crop of the United States at about the same as the previous one.

The price of tobacco is higher than in January last, although the crop is larger. This may partly be ascribed to the increased operations of the manufacturers in Richmond, Petersburg, &c. who worked last year on a very reduced scale. The unusually small stock of Virginia and Kentucky tobacco in this country, also tends to advance the price. This however is not the case in Maryland: the quantity on hand there being large, and it is estimated that the export from thence this year will be very great. The current rates of tobacco in Richmond and Petersburg are \$4 50 to \$7 50, for very inferior up to fair qualities. The increas-

ed cultivation of tobacco in Holland and Germany, lessens the demand for ours in those countries, and the monopoly in France destroys competition in that market.

For flour and grain there is a very limited demand, none being required for export to Europe. Country flour is worth \$4 62½ to \$4 75—city mills \$5 75. The canals of New York being closed, tends to increase the demand for Virginia flour. The stock of wheat is held almost exclusively by the Richmond millers.

The great increase of banking capital in many of the states renders money plenty, particularly where new banks have been created. Some efforts are now making to add to the number of banks in Virginia. If successful, if placed under proper restrictions, and prudently conducted, they may render every branch of business more active; but it may be questioned whether the great increase of such institutions, though apparently producing a momentary advantage, does not ultimately prove injurious, by creating an undue spirit of speculation, and giving a fictitious value to every thing in the shape of property. The policy however being generally adopted by other states, may render it in some measure necessary to counteract it by increasing these establishments in Virginia, and thus prevent an influx of paper from other banks, and the resort of our merchants to those institutions.

It is gratifying to remark the new works of internal improvement which are either commenced, or about to be undertaken. Of the former, is the rail road from Richmond to Fredericksburg and the Potomac, on which active operations are commenced on an extensive scale. The state having agreed to contribute her usual quota to this work, it will be completed with great expedition, and thus an almost entire line of communication by rail road will be formed from North Carolina through Virginia, and thence to Boston. With the aid of some enterprise on the part of North Carolina, the line would be complete to Georgia. That spirit of enterprise we trust will soon be aroused.

The great work of communication from James River to the Ohio will soon be commenced with the liberal aid of the commonwealth and of the city of Richmond—a work of great magnitude, but opening an extensive region of country to the commerce of Virginia, which would otherwise be attracted to Baltimore, or other cities. May the works prosper.

X.

January 26, 1835.

From the [Ohio] Farmer's Reporter.

PRESERVING POTATOES.

A good way of preserving sweet potatoes is when they are dug pack them up in dry sand, being careful to keep them covered so as not to get wet. In this way they will remain all winter as fresh and as good as when first dug. A highly respectable farmer, the quality of whose potatoes I myself tested last spring and found them of the first cut, assured me that this was the method he had practised for a number of years, and found it perfectly successful.

A PROFITABLE CHANGE OF A MILL POND FOR A CANAL.

To the Editor of the Farmers' Register.

Amelia, Dec. 30th, 1834.

The farmers of Virginia may indeed congratulate themselves that there has been established in their state, in your valuable publication, a medium through which useful information and suggestions may be diffused for the public good, which might otherwise probably be known but to a few.

In accordance with your request for presenting such improvements as may have been made to the public, I will endeavor to lay before your readers what I conceive to be an improvement of a kind important to owners of mills, (and not unimportant to the farming interest,) which has been made by myself, by means of a canal, dispensing entirely with the pond. The mill is situated on a small stream, known by the name of Buck Skin Creek, near the dividing line of Amelia and Nottingham, not exceeding three miles in length from the mill to its very source. The pond covered about twenty-five acres of land, and had probably been erected nearly a century. In the summer of 1833, the dam was swept away, and such a breach made, as induced me, as a matter of convenience to myself, to try the experiment with a canal, until the dam could be repaired. The canal was dug, and in a short time, principally with my crop hands, and upon trial was found to far exceed my most sanguine expectations—so much so, that I have declined rebuilding the dam. The present plan is much less troublesome and expensive. I have been enabled to grind for all the custom the mill gets, producing a toll from ten to twelve barrels of corn per month. In addition, I shall be enabled to bring into cultivation about thirty acres of valuable land, and it is highly probable will promote the healthiness of the neighborhood.

There are now two other mills in operation in my county upon the canal plan, that succeed wonderfully well; and could their owners be induced to give their views and experience, they might confer a great benefit upon the community. I do not hesitate to say, that in my opinion, one-half the mills in this section of Virginia might be worked by canals, dispensing with their ponds, thereby adding many valuable acres to the farms, and promoting the general health of the country. The experiment could be made without cutting down the dam. A canal should be cut around the pond at high water mark, until it reaches the stream above the pond. I should never have been induced to have made the experiment had I not been in some degree compelled by a concurrence of providential events; which fact forcibly evinces how unwilling we are to forsake early impressions and habits—believing with most of my neighbors, that such an attempt was futile and visionary.

T. J. P.

For the Farmers' Register.

ON THE NECESSITY OF SYSTEM AND ATTENTION IN THE FARMER'S BUSINESS.

It is entirely useless and unnecessary to waste time, which is precious to all, in querulous narration of the *exceedingly deplorable state* of agricul-

ture—the impoverished, cadaverous aspect commonly exhibited on the surface of the Old Dominion. It is equally useless and unprofitable, to write a funeral oration for soil, long since *defunct*, or departed, and soon to be deposited in the grave of the "great waters." We shall briefly, and we hope more profitably, suggest a few disjointed and unconnected remarks, glancing at the causes, and designating the means to remedy or alleviate evils generally existing, and, we are compelled to acknowledge, exhibited in bold relief.

One of the most prominent causes which depress agriculture in Virginia, is the opinion entertained by many, that slavery is incompatible with improvement in agriculture. There never was a greater mistake—a more fallacious position. There never was an error more fatal in its consequences. A belief in this position, renders it impossible to him who entertains it, ever to improve his system of agriculture. We cannot, we will not persevere in toiling for that which we believe we shall ultimately fail to obtain. Why should we believe the position? We have the entire control of our slaves, and can give their labor what direction we please. Many hold them by inheritance, and have nought to pay for their labor but the moral obligation to feed and clothe them well. No free laborer in America, would perform the amount of labor performed by our slaves for the same remuneration. None can be obtained, either from the North or the South, who will agree to work for their food and clothing alone. All require more than this—consequently, slave labor is cheapest; and the cheapest labor presents the greatest facilities for improvement.

The misapplication of labor, is also a great cause of the depression of agriculture. Because, among other reasons, labor is cheap, no pains have been taken, no thought bestowed, to have it properly applied. This important item of good husbandry, has commonly, and is even now, left to agents uninterested in improvement, and frequently to the ignorance of the negroes themselves. Virginians are peculiarly averse, and bestow but little attention to what they consider the minutiae of the farm: they think it sufficient to give general directions, without attending to the particular application of labor. Consequently, labor is often badly applied—time and attention devoted to one branch of business, which ought to be bestowed on another. In close connection with this evil, is another, and of equal magnitude—a want of practical knowledge, which renders us liable to be imposed on at every point. If we are destitute of practical knowledge, most of the work on the farm will be badly executed, and many evils will follow in the train. From bad work, we cannot reasonably expect good production; it must be proportionably deficient. This makes it necessary, in order to make even a tolerable crop, to expose a larger surface, which must be annually increased, in proportion to the progressive deterioration of the soil, until improvement becomes a dead letter, and soon the last remains of fertility are washed and extracted from the exhausted soil. Many proprietors are so entirely wanting in practical knowledge, that they do not know how to *set* a hilling hoe—and Cuffee may hold a high hand, and for ought they know, be doing good work, with his hoe so fixed that it cannot be made, by ordinary exertion, to cut an inch deep. It would be well if

this was the worst of it. Many, very many, never obtain much better knowledge of practical operations than they commence with: and that is commonly worse than none. This indispensable item in the prosecution of improvement, is also left to others, wholly uninterested in the improvement of the farm. To remedy these evils, rules should be established: it should be an established principle, that all manner and kind of work, should be executed in the best style: quality, and not quantity, should be the primary object of every farmer or planter. We should seldom, if ever, depart from this principle, for the sake of expediency. We should aim to acquire more executive (if I may use the expression) and practical knowledge. If this knowledge cannot be obtained in schools or colleges, it may in agricultural societies. Let us then form agricultural societies, enlist practical men, and apply the lever of associated action; without which, no important reformation has ever been effected—patriotism, philanthropy, and religion, forbid that this principle should be applied to so many objects, and agriculture be left to wend its own slow way unaided, unassisted. Let all lovers of improvement awake to the merits of this noble cause. Let us associate, combine, and bring to the aid of agriculture, that intelligence and enthusiasm, which characterized our ancestors. And the *Old Dominion* will soon put on a beautiful garment of green, "and all her paths drop fatness." All men, of every rank and nation, are deeply interested in the prosperity of agriculture.

The importance of established rules, of systematic operations, especially to the slave holder, is clear and indisputable. Slaves have generally been trained by agents, who have commonly been required to aim at quantity rather than quality in the common work of the farm; consequently, the slaves have acquired bad habits. Having been taught, by bitter experience in many cases, that quantity was the criterion of the day's work, and caring nothing for the benefit of the crop, they have become expert in finding the easiest way—or in other words, to slight all kinds of work. This is true, with regard to the great majority. Having fallen into bad habits, confirmed by time, there is a strong necessity for a thorough and radical change in the plan of operation, or they will be forever falling back into their old ways; of making smooth the outside, regardless of the internal; which is the most important consideration. All intelligent, all thinking men, subscribe to the *force of education*—that it is strong and powerful—it has its influence on the slave as well as the free-man; "just as the twig is bent the tree's inclined." Hence, the necessity of having them well taught—of established rules—of systematic operation. Wherever it is practicable, the measuring rod should be applied; when impracticable, the work should be weighed or numbered. We have known the execution considerably improved, and from 25 to 33 per cent. added to the day's work, merely by counting the bundles of tobacco stripped and tied up, at the close of the day's work. When it is known by the hands that the quality of the work is to be rigidly inspected, as well as the quantity, they will take more pains in the execution; and the quantity will be increased, as well as the execution improved.

The necessity is urgent on Virginians, to attend to this subject in all its various ramifications. It

requires intelligence and energy to resuscitate their impoverished fields, and bring them back to that state, in which they can behold them with pleasure, and in which we may anticipate a plentiful and prosperous futurity.

Let us then give to this important subject, the attention it so imperiously demands—let us give to the winds the false theory that slavery is incompatible with improvement—let us attend well to the application and execution of labor—let us obtain practical knowledge by forming agricultural societies—let us adopt systematic operation in every department—let us resolve that all our flat land shall be thoroughly drained—all our uplands receive as many trenches or conductors, as will be fully sufficient to conduct all the superfluous water in excessive rains—to sow all our arable land in grass—confine the hoof and the tooth to standing pastures—pay strict attention, and use strict economy in all the sources of manure. Let us attend to these particulars, and we shall soon see improvement in our fields, and plenty in our barns.

The anticipation of a long journey presents formidable barriers to a person unaccustomed to travelling; as long as the journey is in prospect, almost insurmountable difficulties arise. Imagination makes mountains of mole hills—there are lions in the way—the expense of the trip—the length of the way—the toil and fatigue of travelling—and many imaginary dangers standing thick around—discourage and conspire to make the journey formidable. We have only to "screw our courage to the sticking place;" to start, and all the difficulties vanish. The journey though long, is easily and pleasantly performed. Similar to this, is the commencement and the prosecution of a scheme of improvement. Opinions of long standing, prejudices strong and inveterate, established habits, expensive bills, trouble and vexation, stare us in the face, at the threshold of improvement. Commence, the difficulties are removed—the lions are chained. Excited and interested, more attention is bestowed; profit and improvement go hand in hand.

CHARLOTTE COUNTY.

For the Farmers' Register.

LIST OF PREMIUMS OFFERED BY THE BUCKINGHAM AGRICULTURAL SOCIETY.

1. For the best thorough bred stallion over two and under four years old—one year's subscription to the New York Sporting Magazine.
2. For the best thorough bred brood mare—one year's subscription to the American Turf Register and Sporting Magazine.
3. For the best thorough bred colt under two years old—the same as No. 2.
4. For the best thorough bred filly under two years old—the 1st vol. of Edgar's stud book.
5. For the best brood mare other than thorough bred—the same as No. 2.
6. For the best colt or filly other than thorough bred under two years old—the same as No. 2.
7. For the best jack over three years old—one year's subscription to the Farmers' Register.
8. For the best mule raised in the county, under five years old—Farmer & Mechanic, and Ohio Farmer.
9. For the best bull over two years old—the same as No. 7, and Genesee Farmer.

10. For the best bull under two years old—one year's subscription to the Southern Agriculturist.

11. For the best cow over three years old—one year's subscription to the New York Farmer and the Northern Farmer.

12. For the best heifer under three years old—one year's subscription to the Southern Planter and the Ohio Farmer.

13. For the best fattened ox or cow—buck carvers and steel—cost, not over \$6.

14. For the second best—the same—cost, not to exceed \$4.

15. For the best yoke of work oxen—the same as No. 7.

16. For the best ram—one year's subscription to the New York Farmer.

17. For the pen of best ewes, not less than six—one year's subscription to the Genesee Farmer and Farmers' Reporter.

18. For the second best—one year's subscription to the Genesee Farmer.

19. For the best boar—one year's subscription to the Maine Farmer and Northern Farmer.

20. For the best sow—one year's subscription to the Maine Farmer and Farmers' Reporter.

21. For the heaviest hog (live weight,) under one year old—ivory carvers and steel—cost, not over \$4.

22. For the best suit of clothes, that is, coat, pantaloons and vest, made at home of wool and cotton, (the exhibitor wearing the same on the day of show and fair)—a pair of silver sugar tongs—cost, not over \$3.

23. For the best piece of negro winter clothing not less than ten yards—a pair of silver sugar tongs—cost, not over \$2.50.

24. For the best piece of carpeting not less than ten yards—a Britannia coffee pot—cost, not over \$5.

25. For the best pair of stockings of wool, cotton, thread or silk—a silver thimble—cost, not over \$1.

26. For the best specimen of domestic fabric (other than what is above named) made of wool, cotton, flax, hemp, silk, grass, any or all combined—a cream ladle—cost, not over \$3.

27. For the greatest product in corn, not less than five adjacent acres—a two-horse plough.

28. For the greatest product in wheat, not less than ten adjacent acres—a three-horse plough.

29. For the greatest product (that is, the most money,) in tobacco, not less than five adjacent acres—a two-horse plough.

30. For the best farm, not less than 100 acres—a silver cup—cost, not over \$12.

31. For the second best—the same—cost, not over \$10.

32. For the third best—the same—cost, not over \$8.

HOW TO CONSTRUCT AN "EDITORIAL COMMUNICATION."

To the Editor of the Farmers' Register.

It will be admitted, Mr. Editor, that the interest taken by readers in your journal, and also its general reputation, will depend in a very great degree upon what proportion of each number consists of original communications. It is very true, (as I have seen stated lately in another periodical,) that "a good article is none the worse because it has

appeared before, and in some other work." But notwithstanding, readers do not like to be confined to second-hand articles, though they may be "as good as new." They think, and very reasonably too, that if the journals which furnish these articles at first, are equally cheap and accessible, it would be as well to have the articles in *them*, when both *new* and *good*.

Under this feeling, (whether right or wrong,) when I receive a new number of the Farmers' Register, I am sure first to look over your Table of Contents; and most cheerfully do I accord in the general opinion that your monthly bill of fare is always good, and presents a large and increasing proportion of original communications. But though your readers are satisfied in this respect, (and certainly I am for one,) still permit me to say, that you do not make the most of your opportunities; and if you will profit by the example which I shall place before you, your list of "original communications" may easily be made much longer than it is, and they can even completely "elbow out" all the selected articles, without losing a particle of their value. I will offer you a single fact as a striking illustration of this plan, and leave you to make the application. *Verbum sat, &c.*

Not long ago I first met with a copy of the agricultural journal called the * * * * *. In glancing over the list of "original communications" in the Table of Contents, my attention was attracted by the title of " * * * * * By the Editor." Turning to the page referred to, I found the same *imposing* title over a piece beginning with a paragraph by the editor, but which was merely introductory to the long communication which appeared first in No. * of the Farmers' Register, and which was here copied entire, except the initial letters which formed the original signature. Now it is true, that if one reads *carefully* the introductory lines, he will there find that the very long tail-piece to the small body, was copied from your publication. But the slight observer, as well as any other journals that might think fit to republish from this copy, would give credit for the whole, as it was there marked, to the editor of the * * * * *, and not to the Farmers' Register.

Now I pray you, Mr. Editor, to observe the great advantage of this manner of constructing "original communications—by the editor." By the favor of the writer of this piece, you first enjoyed all the benefit of publishing his original communication; and next, your brother editor, by favor of his own ingenuity, enjoyed not only an equal, but a greater advantage—for it is not only claimed (in effect) as original, but as from his own pen.

If you had chosen to profit by this plan of writing editorials, all the various selected articles to which you have prefixed a few lines of your own remarks, would have figured as "original communications—by the editor"—and you may thus, with the utmost ease, appropriate to yourself every other piece that may hereafter be worth your selecting.

SOUTH.

Feb. 15th, 1834.

P. S. I have since seen proof of the practical value of the plan above described. Mr. N—'s directions to * * * * *

No. *, Farmers' Register, have been, by virtue of only two lines of introduction, appropriated by the editor of the aforesaid * * * * *, as I learn by seeing the passage quoted from that publication (instead of yours,) by both our Southern Agriculturist, and Southern Planter. This sufficiently proves that the editors of both those journals were deceived by the form thus given to the article.

From an English Paper.

THE DEEPEST MINE IN GREAT BRITAIN.

The shaft at present sinking at Monkwearmouth Colliery, near Sunderland, has attained a considerably greater depth than any mine in Great Britain, (or estimating its depth from the level of the sea, than any mine in the world.) Pearce's shaft at the Consolidated Mines in Cornwall was, till lately, the deepest in the island, being about 1,470 feet in perpendicular depth, of which 1,150 feet are below the surface of the sea. The bottom of Wolf's shaft (also at the Consolidated Mines) is 1,230 feet below the sea; but its total depth is less than that of Pearce's shaft. The bottom of the Monkwearmouth shaft is already upwards of 1,500 feet below high water mark, and 1,600 feet below the surface of the ground. It was commenced in May, 1826. The upper part of the shaft passes through the lower magnesian limestone strata, which overlap the south-eastern district of the Great Newcastle Coal-field, and which, including a stratum of "freestone sand" at the bottom of the limestone, extended, at Monkwearmouth, to the thickness of 330 feet, and discharged towards the bottom of the strata the prodigious quantity of 3,000 gallons per minute—for the raising of which into an off-take drift, a double-acting steam-engine, working with a power of from 180 to 200 horses, was found necessary. The first unequivocal stratum of the coal formation, viz., a bed of coals one and a half inches thick, was not reached till August, 1831, (being about 344 feet below the surface,) after which the tremendous influx of water which had so long impeded the sinking operations was "stopped back" by a cylindrical "metal tubbing" or casing, fitted (in a series of small portions) to the shaft, and extending from below the above bed of coal to within 26 yards of the surface. The sinking now proceeded with spirit—still, no valuable bed of coal was reached, although the shaft had passed considerably above 600 feet into the coal measures, and much deeper than had hitherto been found requisite for reaching some of the known seams. It became evident that the miners were in unknown ground. A new "feeder of water" was encountered at the great depth of 1,000 feet, requiring fresh pumps and a fresh outlay of money. The prospects of the owners became unpromising in the eyes of most men, and were denounced as hopeless by many of the coal-viewers! Coal-viewing, however, had as yet been limited to some 200 or 220 fathoms; and the views of the Messrs. Pemberton (the enterprising owners of this colliery) were not to be bounded by such ordinary depths; they considered rightly that the thickness of the coal formation might be vastly greater where protected by the super-incumbent limestone, than where exposed to those denudations which in the neighborhood of the "rise" collieries

had probably swept away the strata through which their own shaft had hitherto been sunk; that they were therefore justified in anticipating the larger and known seams at greater depths; and that, in case these larger seams had been split into smaller strata, the same causes which in other places had produced their subdivision might, at Monkwearmouth, have effected their junction. They continued therefore their sinking, and in October last reached a seam of considerable value and thickness, at the depth of 1,578 feet below the surface, and presuming that this newly discovered seam was identified with the Bensham seam of the Tyne (or Maudlin seam of the Wear,) they are rapidly deepening their shafts, in anticipation of reaching the Hutton or most valuable seam, at no distant period, but which (if their anticipations are well founded) will be found at a depth approaching 300 fathoms from the surface! In the meantime, however, workings have very recently commenced in the supposed Bensham seam. A party of scientific gentlemen descended into these workings on Saturday last, and aided by every facility and assistance which could be afforded to them by Messrs. Pemberton, made several barometric and thermometric observations, the detail of which will be deeply interesting to many of our readers. A barometer at the top of the shaft (87 feet above high water mark) stood at 30.518, its attached thermometer (Fahrenheit) being 53. On being carried down to the new workings (1,584 feet below the top) it stood at 32.280, and in all probability higher than ever before seen by human eye! the attached thermometer being 58. Four workings or drifts had been commenced in the coal, the longest of them being that "to the dip," twenty-two yards in length, and nearly two in breadth—to the end of which the current of fresh air for ventilating the mine was diverted—(and from which the pitmen employed in the excavation had just departed) was selected for the following thermometric observations. (Temperature of the current of air near the entrance of the drift 62 (Fahrenheit); near the end of the drift, 63; close to the face or extremity of the drift, and beyond the current of air, 68.) A piece of coal was hewn from the face; and two thermometers placed in the spot just before occupied by the coal (their bulbs being instantly covered with coal dust) rose to 71. A small pool of water was standing at the end of the drift. Temperature of this water at eleven o'clock, 70; three hours later, 69½. A register thermometer was buried 18 inches deep below the floor, and about ten yards from the entrance of the drift; forty minutes afterwards its maximum temperature was 67. Another register thermometer was similarly buried near the end of the drift, and after a similar period indicated a maximum temperature of 70. It was then placed in a deeper hole and covered with small coal:—some water oozed out of the side of this hole to the depth of six or eight inches above the thermometer, which, upon being examined after a sufficient interval of time, indicated a temperature of 71½. A stream of gas bubbles (igniting with the flame of a candle) issued through the water collected in this hole; the bulbs of two very sensible thermometers were immersed under water in this stream of gas, and indicated a temperature constantly varying between 71.5 and 72.6. A thermometer was lowered to the bottom of a hole drilled to the depth

of 24 feet into the floor of another of the workings, and the atmospheric air excluded from it by a tight stopping of clay; this thermometer being raised after a lapse of 48 hours, stood at 71.2. The above observations will accord with the prevailing (and certainly well-grounded) opinion, that the temperature of the earth increases with the depth from the surface. It must not, however, be forgotten, that causes may be assigned for an increase of temperature in this and other coal mines, independently of the presumed subterranean heat. Those who are familiar with coal mines must have frequently witnessed the effects of the enormous pressure of the superincumbent strata, and a weight of twenty-five or thirty thousand tons which had lately reposed upon the coal hitherto occupying the drift above described, had suddenly been transferred to the coal situate on the sides of this drift. Hence those constant indications of tremendous pressure—the cracking of the sides and roof, and “heaving of the floor,” and the crumbling of their materials, furnishing admission of air and water to innumerable fragments of shale, coal, and pyrites;—circumstances which are abundantly calculated to occasion an increase of temperature, both by mechanical compression and chemical decomposition, although wholly inadequate, as we conceive, to the generation of the temperature recorded on Saturday last: and the presence and lights of the pitmen were obviously inoperative in producing the effects remarked. Other experiments, however, in the prosecution of these inquiries, are, with the obliging permission of the owners, contemplated at Monkwearmouth Colliery, and amongst the minor advantages arising from their magnificent undertaking, will doubtless be the solution of any remaining doubts of the existence of considerable subterranean heat at accessible depths beneath the surface of the earth.

From the Penny Magazine.

ACCOUNT OF THE MERINO SHEEP, AND THE MESTA OF SPAIN.

Merino is the name of a Spanish breed or variety of sheep, which affords a wool esteemed to be finer than that which any other European breed produces. In this breed the males have horns, but the females are without them. They have generally white faces and legs. The body does not seem very perfect in shape; the legs are long, the bones small; and under the throat the skin is somewhat pendulous and loose. The skin of the animal is fine and clear. When they are somewhat fat, the weight, per quarter, of the ram is about seventeen pounds, and of the ewe about eleven pounds.

The sheep of Spain are divided into two principal sorts: the common sheep, which continue on the grounds of their owners, and are housed in winter; and the Merinos, which always remain in the open air, travelling before the summer to the cool mountains, and returning before the winter to the warm plains. The stationary sheep chiefly belong to the eastern provinces of Spain; while the Merinos belong to the central and western parts—the Castiles, Leon, and Estremadura. In summer they resort chiefly to the plains of the latter provinces, and in winter to the mountainous parts of Castile, which form the most elevated

part of Spain, and abound in aromatic plants and fine pastures. Different accounts are given of the origin of this practice; but we have no distinct knowledge of the existence of travelling flocks in Spain until the time when the Christians began to prevail against the Mohammedans in the thirteenth century, and came down from the mountains of the north into the provinces of the centre and the south. After that time, however, the system of migration became well and firmly established; and before the Moorish kingdom of Granada had been finally reduced in the fifteenth century, the system had been organized, under the authority of the government, in nearly its present form. This we shall now proceed to describe, taking Laborde, a statistical writer on Spain, as our principal guide in the description.

There is an institution peculiar to Spain called the *mesta*. It is a society of noblemen and other great proprietors, to whom the migratory sheep belong; who are empowered to make regulations concerning the migrations of the flocks; and who, in fact, are a great co-operative body of capitalists. Unfortunately they possess powers and privileges much at variance with the interests of the people. The term *mesta* is also applied to the great body of the migratory sheep in general; while the particular flocks are called *Merinos* and *transhumantes*.

These flocks, when assembled for migration, generally consist of about ten thousand sheep. Every flock is conducted by an officer called a *mayoral*, whose business it is to superintend the shepherds and direct the route: he is generally an active man, well acquainted with the kinds of pasturage, the nature of sheep, and the method of treatment. Under him there are commonly about fifty shepherds, each of whom is allowed to keep a few sheep or goats of his own in the flock, on the understanding, that although they and any young they may produce are his property, the wool and the hair belong to the proprietor of the flock. The number of persons thus employed in the care of the whole of the flocks that compose the *mesta* are about forty-five or fifty thousand. The dogs are also very numerous, fifty being the number commonly allowed to each flock.

It is at the latter end of April, or the beginning of May, that the flocks leave the plains for the mountains. When they have been driven to the place where they are to remain, the shepherds give them as much salt as they are willing to lick; and the quantity of this article allowed for their consumption during the five summer months is one ton for every thousand sheep. At the end of July the rams are permitted to associate with the ewes, but before and after that time they are kept separate. In September the backs and loins of the sheep are rubbed with red ochre dissolved in water; and towards the end of the same month they recommence their march to the plains of Leon, Estremadura, and Andalusia. The sheep are generally conducted to the same ground which they had grazed the preceding year, and where most of the lambs were born. Here folds are constructed for the sheep, and huts of branches for the shepherds; and there they remain during the winter. The birth of the lambs takes place shortly after the arrival of the flocks in winter quarters; and particular attention is paid to prepare them by good diet for the journey in April. In

March the shepherds have much to do with the lambs: they cut the tails, mark the nose with a hot iron, and saw off the points of the horns. When the time approaches for the flocks to depart for the mountains, they indicate their desire to migrate by their restlessness, and by their endeavors to escape. The shearing takes place in the month of May, during the summer journey. This business is introduced with much of preparation and ceremony, and the intervals of the labor are cheered by a great deal of jollity and merry-making. The shearing is performed under cover. The animals are previously put into a building consisting of two apartments, from four to eight hundred paces long and one hundred wide. As many of the sheep as are to be sheared the following day are taken in the evening into a narrow, long, low hut, called the *sweating-house*, where, being much crowded together, they perspire freely, which renders the wool softer and more easy to be cut. This is one of the practices the Spaniards appear to have derived from the Romans. One hundred and twenty-five men are usually employed for shearing a thousand ewes, and two hundred for a thousand wethers. Each sheep affords four kinds of wool, more or less fine according to the parts of the animal whence it is taken. The rams yield more wool than the ewes, but not of so fine a quality; three rams or five ewes afford twenty-five pounds. The wool is sorted and washed before being sent away. The sheep that have been sheared are carried to another place and marked; and those which, in the course of the individual inspection they undergo on this occasion, are found to have lost their teeth, are set apart to be killed for mutton.

The journey which the flocks make in their migration is regulated by particular laws and immemorial customs. The sheep pass unmolested over the pastures belonging to the villages and the commons which lie in their road, and have a right to feed on them. They are not, however, allowed to pass over cultivated lands, but the proprietors of such lands are obliged to leave for them a path of about eighty-four yards in breadth. When they traverse the commonable pastures, they seldom travel more than six miles a day; but when they walk in close order through the cultivated fields, they often proceed upwards of eighteen miles, and they have sometimes been known to go twenty-five or thirty miles in one day, in order to reach a convenient place for halting. The whole of their journey, is usually an extent of from 360 to 420 miles, which they perform in thirty or thirty-five days. Popular opinion in Spain attributes the superiority of the wool in the Merino to these periodical migrations; but this appears to be disproved by the fact that the wool of the stationary sheep is sometimes equally good, and still more by the very great superiority of the wool of the German Merino, which does not migrate at all. The number of the migratory sheep in Spain is at present estimated at 10,000,000, and of the stationary at 8,000,000.

The existence of the system which we have been describing is considered to constitute a great bar to agricultural improvement in Spain. The mesta, of which we have already spoken, has a code of peculiar laws, administered by four judges, whose jurisdiction extends to all matters that are in any degree connected with the mesta, and who

take particular care than none of its privileges shall be infringed. Among the evils which the system produces, it is complained that the forty or fifty thousand persons employed in attending the sheep are lost to the state, as to the purposes of agriculture and population, as they scarcely ever marry;—that a vast quantity of good land is converted into pasturage, and produces comparatively nothing;—that great damage is committed with impunity to the cultivated lands during the journeys of the flocks—and this is so much the more injurious as, at the time of the first journey, the corn is considerably advanced in its growth, and at the second, the vines are loaded with grapes;—that the commonable pastures also are so completely devastated by the migratory flocks, that the sheep of the resident population can hardly pick up a subsistence;—and that the flocks of the mesta are of no use in an agricultural point of view, for, as they are never folded upon arable land, they contribute nothing to its fertilization. Besides this, the directors and shepherds are dreaded in every place to which they come, for they exercise a most intolerable despotism—the consequence of the improper privilege which they possess of bringing whoever they may choose to insult before the tribunal of the mesta, whose decisions are almost invariably in favor of its servants. The existence of the mesta has therefore long been a subject of public complaint and remonstrance, and even the general states of the realm have been continually requesting the suppression of it. For a long series of years these appeals were made in vain, but about the middle of the last century the government felt itself obliged to pay some attention to the subject. A committee of inquiry was therefore appointed to take the matter into consideration, but the influence of the mesta prevailed in the committee and elsewhere; so that though the commission is still, we believe, understood to exist, it has not yet given its opinion on the subject of the mesta, or proposed any remedy for the evils it produces.

"The Merino, or Spanish breed of sheep, was introduced into this country [England] about the close of last century. George III. was a great patron of this breed, which was, for several years, a very great favorite. But it has been ascertained that, though the fleece does not much degenerate here, the carcass, which is naturally ill-formed, and affords comparatively little weight of meat, does not improve; and as the farmer, in the kind of sheep which he keeps, must look not only to the produce of the wool, but also to the butcher-market, he has found it his interest to return to the native breeds of his own country and abandon the Spanish sheep. They have, however, been of considerable service to the flocks of England, having been judiciously crossed with the South Down, Ryeland, &c." The Merino was introduced into most of the other countries of Europe, in the course of the last century, with very various success. It has also at later periods been carried out to New South Wales, Van Diemen's Land, the Cape of Good Hope, and the United States; and it seems now to have been sufficiently established that, wherever the animal has been attended to for the sake of its wool, it will afford good wool, but that the quality of the wool deteriorates when that of the mutton becomes an object.

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EDMUND RUFFIN, EDITOR AND PROPRIETOR.

Extracts from the last edition of the "Complete Grazier."
ON THE ECONOMY AND MANAGEMENT OF
THE DAIRY.

*Of the situation and buildings proper for a dairy.—
Dairy utensils.*

[Continued from page 558, Vol. II.]

A dairy ought, if possible, so to be arranged, that its lattices may never front the south, south-west, south-east, or west;—a northern aspect is the best; but there should be openings on two sides of the building—the north and east, if possible—in order to admit a free current of air. These lattices, which are in every respect superior to glazed lights, may be covered in summer, with gauze wire, or with oiled paper, pasted on pack-thread stretched for that purpose, so as to admit the light, whenever it may be necessary to exclude the cold or wind.*

The situation, for the sake of convenience, should be near the cow-house, as well as the farm-house; but care should at the same time be taken; that it be so far removed as not to be exposed to the effluvia of the cow-house, stables, or farm-yard; as any bad scent might taint the milk, and give an unpleasant flavor to the butter. It frequently happens that the dairy adjoins the cow-house; but in that case, at least no communication should be left between them.

In its construction, as it is of material importance that the heat be of one uniform temperature, of from fifty to fifty-five degrees of Fahrenheit's thermometer, double walls and a roof have been recommended, leaving a space of one or two feet, or more, between the wall and the lath and plaster. Mr. Marshall, to whose practical skill our pages bear ample testimony, advises the walls to be constructed six feet thick, one foot on the inside to be of brick or stone, the outside to be of sod, and the intermediate space to be closely filled with earth. The roof, which should be of thatch, should be at least three feet thick, and should project completely over the walls on each side; and as all these materials are non-conductors of heat, he is of opinion, that a dairy thus built, would, if provided with double doors, preserve the degree of heat above mentioned, throughout the year. If sunk a few feet below the surface of the earth, an equal temperature would be still further ensured; but then it should be strictly ascertained that the ground is perfectly free from damp: dryness and ventilation being the most important objects in its construction. The dairy should be neatly paved with stone, or, if this cannot be procured; with red bricks, laid on a gentle descent, and the joinings should be well cemented together, lest any water should stagnate. It will likewise be proper daily to wash the pavement during summer; but great care should be taken to dry it immediately, as damp promotes the putrefaction, or turning, of milk; and as dairy-houses cannot be kept too cool at that season, it will be of great advantage to

build them, if possible, near a cold spring or rivulet.

If a small current could be conducted through the premises, or water were, by means of a pipe, so introduced as to fall from some height on the pavement, and run off in a constant stream, without stagnating, it will be of great advantage, as it will contribute much to preserve the air continually pure, fresh, and cool. But as the milk itself, when brought in warm, will naturally tend to raise the temperature of the milk-room too high, it is recommended to have an ice-house attached to the dairy, especially where the advantage of a current of water cannot be obtained. This should be surrounded with double walls, with an interval between them like the dairy. The place for holding the ice should be formed of upright posts, lined with wattled work of wands or close rail work, leaving a path all round, of two feet and a half in width; and round this is to be formed a gutter to carry off the water dropping from the ice. This mode of constructing an ice-house, is not only the cheapest, but also far preferable to the common practice of making cellars under ground, which are both more expensive, as well as liable to mould and rotteness. The structure of such an ice-house, attached to a dairy, would prove much less expensive than is commonly imagined; and by its utility in that, and other respects, would amply compensate the cost.

In winter, on the contrary, it is equally important that the requisite degree of heat should be constantly maintained. If the building, as commonly is the case, form part of the house, it will generally be found sufficiently warm without the addition of artificial heat; but, in very cold weather, in detached dairies, unless they are constructed as already described, it is difficult to preserve the proper temperature without the aid of a stove. The expense is of no consideration, when put in comparison with the advantage; but great attention is required in its management, for if too much warmth be admitted, it will be as injurious as too little, and it will be useless if neglected during the night, for if the dairy be allowed to become too cold, the injury done to the milk cannot be repaired by afterwards warming it.

As the greatest cleanliness is requisite in the various departments of the dairy, a well-arranged building should have separate apartments in order to perform its business properly. A butter dairy ought to comprise three; one for receiving the milk, another for performing the operation of churning, and a third for containing and cleaning the various utensils. For a cheese dairy, four rooms will be requisite, viz. a milk-room, as before, another for making and pressing the cheese, a third for salting it, and a fourth (which may be commodiously placed as a loft over the others) for storing and preserving them until brought to market. The receiving-room, however, should not communicate with the others by interior doors or windows, for the milk would be injured by the heat and steam arising from them; and an open shed, formed by the projecting roof of the building, will generally be found sufficient for scouring

* Lattices in dairies are exempted from the tax on windows, but not glazed lights.

and drying the vessels. The churning-room should be provided with a boiler, of dimensions suited to the number of cows employed, for warming water, milk, and whey; and must contain sufficient space for conveniently performing all the operations of the dairy, whether it be devoted to the manufacture of butter or cheese. Where a dairy is confined to the sale of milk, two apartments will suffice, one for containing the milk as it is brought in, and another for serving it out, scalding, and keeping the utensils. As these, however, are rarely to be found in the common dairies, it will be the more necessary to pay the strictest attention to order and neatness in those which do not possess so many conveniences. Should the temperature of the milk-room become affected by the carrying of newly-drawn milk into it, it may easily be reduced to the proper degree, by suspending a small quantity of ice at a considerable height from the floor; and if, during winter, the cold should become too great, and that it is not provided with a stove, a barrel of hot water closely stopped, or a few hot bricks, placed on the floor or table of the milk-room, will readily counteract its effects. But on no account whatever should a chafing dish with burning coals be used, as it will certainly impart a bad taste to the milk.

The utensils of a dairy comprise pails, sieves, coolers, churns, creaming-dishes, cheese-vats, ladders, and presses; all of which are so familiar to every dairy-woman that it would be only waste of time to describe them. To these should be added a Fahrenheit's thermometer, which should be suspended in a central part of the milk-house. Wood is the material usually employed, and, with requisite care, nothing can be more sweet or proper; but they require the closest attention in scouring and scalding every time they have been used, as the smallest drop of milk left in them, or the least taint of acidity or mustiness, will infallibly spoil the next milking. Wherever the size and shape of the utensils will admit, earthenware vessels, properly glazed, will therefore be found less troublesome: but lead, copper, or brass utensils, as well as earthenware vessels glazed with lead, ought on no pretext whatever to be used; for the acid which is contained in milk that has been long exposed to the air, combines with these metals, and forms a poisonous compound with them, which, though perhaps not absolutely deleterious in any serious degree, has yet been found to impart a disagreeable flavor to the milk. Cast-iron, though it does not form a poisonous compound with the milk, is by no means unexceptionable, because it does form a compound that may, in a considerable degree, affect or change the taste and quality of dairy products. Of all metallic dishes, those invented a few years since by Mr. Baird, of Shott's ironworks in Linlithgowshire, are perhaps liable to the fewest objections, as the tin with which they are coated is acted upon by the acid of milk in a very slight degree. These vessels are made of cast-iron softened by annealing in charcoal, so that they will not break by an ordinary fall, turned smooth in the inside, and laid over with a coat of tin to prevent the iron from coming in contact with the milk. These milk dishes are coming into very general use; and their invention is one of the greatest improvements in dairy management. They are kept more easily clean than wooden vessels: and their superior

power of conducting heat cools the milk so rapidly, that the Scottish farmers' wives, who have given them a fair trial, affirm, that they throw up one third more cream from an equal quantity of milk. It has been lately found that slate makes very good milk coolers, and in some of the midland counties the common flag slate is employed for the purpose.

All dairy utensils ought to be most carefully scoured, first with hot water, and afterwards rinsed, with cold, and kept in an airy place, in order that every possible degree of acidity may be removed. Should one or two scourings be insufficient, they must be repeatedly cleansed until they become entirely sweet, as the slightest taint or acidity may cause material loss.

The churn in most common use is that denominated the *plunge-churn*, the structure of which is too well known to require any description. It is made of any size, from ten gallons to near a hundred, when worked by hand; but in large dairies, where the system of churning from the whole milk is adopted, it is frequently wrought by horse-power, and is then much larger. The tedious manner in which it operates, has occasioned the invention of many others, among which the *barrel-churn* has been most generally adopted, in consequence of the superior ease with which it is worked; there is, however, a prejudice against it in many dairies, where it is supposed that it does not extract the butter so well as by the old, though more laborious method; but the contrary is asserted by its advocates.*

Of the management of milk and cream, and the making and preservation of butter.

The quality of cows' milk greatly depends on the nature of their food, which likewise materially affects the quantity they will yield; though this last circumstance is, in some measure, regulated by the manner of milking them. It will, therefore, be necessary to be very cautious in choosing milkers, because, if a cow be roughly handled, it is not only painful to her, but will also cause her to withhold her milk, whereas, if it be gently drawn, she will yield it freely; and it is of importance that it be drawn to the last drop, for it will otherwise decrease at each succeeding meal. As it sometimes happens that cows are *ticklish*, they should, on such occasions, by no means be harshly or severely treated; and if the udder be hard and painful, it ought to be fomented tenderly with luke-warm water, and stroked gently, by which simple expedient she will be brought into good temper, and yield her milk with pleasure and freedom. It is also proper to feed the cows at the time of milking, for, while eating, they give out

* We omit here the description of two improvements on churns, because of the want of the necessary explanatory cuts, which would be more costly and inconvenient than the object would be worth. It is enough to state that the churns supposed by the author to be best, and therefore selected for particular description, are 1st, one of our own country, manufactured by Messrs. Wright and Co. of Philadelphia, and 2nd, Mr. W. Bowler's churn, for which was awarded a premium by the Society for the Encouragement of Arts.—ED. FAR. REG.

their milk with greater freedom, and they are prevented by the motion of their jaws, from the common, and very pernicious trick of withholding their milk; by which, if not promptly prevented, they will soon become dry.

In this country, it is the general practice to milk cows twice in the course of twenty-four hours, throughout the year; but, in summer, the proper periods are at least three every day, and at intervals as nearly equidistant as possible, viz. very early in the morning, at noon, and a little before the approach of night. For it is said to be a fact, confirmed by the experience of those who have tried it, that cows, when milked thrice in the day, will yield more milk in point of quantity, and of as good, if not better, quality, than they will under the common mode of milking only on the morning and evening.

After the milk is drawn from the cow, it should be carefully strained through a gauze or linen cloth, stretched on an open bottomed wooden bowl, or a hair-sieve, or through a sieve made of silver wires, on account of its superior wholesomeness, into the cream-dishes, which should never exceed three inches in depth, though they may be made so wide as to contain any quantity required, and which ought to be perfectly clean, sweet, and cool. If any ill flavor is apprehended from the cows having eaten turnips, &c. the addition of one-eighth part of boiling water to the milk, before it is poured into the dishes, will, in a great degree, remove it; and, when filled, the dishes ought to be set upon shelves, or dressers, there to continue till the cream is removed.* It should also be observed that:—

I. The milk first drawn from a cow is always thinner, and inferior in quality to that afterwards obtained; and this richness increases progressively to the very last drop that can be drawn from the udder.

II. The portion of cream rising first to the surface, is richer in point of quality, and greater in quantity, than that which rises in the second equal space of time, and so of the rest; the cream continually decreasing, and growing worse than the preceding.

III. Thick milk produces a smaller proportion of cream than that which is thinner, though the cream of the former is of a richer quality. If thick milk, therefore, be diluted with water, it will afford more cream than it would have yielded in its pure state, though its quality will at the same time be inferior.

IV. Milk carried about in pails, or other vessels, agitated and partly cooled before it be poured into the milk-pans, never throws up such good and plentiful cream as it had been put into proper

vessels immediately after it came from the cow.

From these fundamental facts, some important inferences, serving to direct the practice, may be deduced, among which we can only notice the following:—

1. It is evidently of much importance, that the cows should be always milked as near the dairy as possible, to prevent the necessity of carrying and cooling the milk before it be put into the dishes; and as cows are much hurt by far driving, it must be a great advantage in a dairy-farm, where the practice of house-feeding is not adopted, to have the principal grass fields as near the dairy homesteads as possible.

2. The practice of putting the milk of all the cows of a large dairy into one vessel, as it is milked, there to remain till the whole milking be finished, before any part is put into the milk-pans, seems to be highly injudicious, not only on account of the loss sustained by the agitation and cooling; but also because it prevents the owner of the dairy from distinguishing the good from the bad cow's milk, so as to enlighten his judgement respecting the profit that he may derive from each. A better practice, therefore, would be, to have the milk drawn from each cow separately, put into the creaming-pans as soon as milked, without being ever mixed with any other; and if these pans were labelled with the cow's name, the careful dairyman would thus be enabled to remark, without any trouble, the quantity of milk afforded by each cow every day, as well as the peculiar qualities of the milk.

A small quantity of clear water, cold in summer, and warm in winter, put into the bottom of the milk-pan, will be found to assist the rising of the cream; but it is thought by some persons to be prejudicial to the butter.

3. If it be intended to make butter of a *very fine quality*, it will be advisable, not only to reject entirely the milk of all those cows which yield cream of a bad quality, but also, in every case, to keep the milk that is first drawn from the cow, at each milking, entirely separate from that which is got last; as it is obvious, that, if this be not done, the quality of the butter must be greatly debased, without much augmenting its quantity. It is also obvious, that the quality of the butter will be improved in proportion to the smallness of the quantity of the last-drawn milk which is used, as it increases in richness to the very last drop that can be obtained from the udder at that time; so that those who wish to be singularly nice, will do well to keep for their best butter a proportion only of the *last-drawn milk*; in like manner of the *first-drawn cream*.

It is a matter of some importance, to determine in what way the inferior milk, thus set apart when *fine butter* is wanted, can be employed with the greatest profit. In the Highlands of Scotland, the people have adopted a practice which answers many good purposes. As the rearing of calves is there a principal object with the farmer, every cow is allowed to suckle her calf with a portion of her milk, the remainder only being employed for the purposes of the dairy. To give the calf the proportion allotted to it regularly, it is separated from the cow, and put into a small enclosure made

* Mr. Young has recommended the dairy-man to boil two ounces of nitre in one quart of water, and to bottle the mixture; of which, when cold, a large tea-cup full is to be added to ten or twelve quarts of milk as soon as it comes from the cow: the quantity of saltpetre is to be increased as the turnips become stronger. The feeding of cows with the roots alone will, as the Earl of Egremont found, prevent the milk from having a bad taste. Another method of removing any ill flavor, arising from the cows having eaten turnips, consists in warming the cream, and afterwards pouring it into a vessel of cold water; from which the cream is to be skimmed as it rises to the surface, and thus the unpleasant taste will be left behind in the water.

* A provincial word, denoting the person who has the chief concern in a dairy.

for the express purpose, on every farm, of confining the calves. At regular times, the cows are brought to the door of this enclosure, where the young ones fail not to meet them. Each calf is then separately led out, and runs directly to its mother, where it is allowed to suck till the dairy-maid judges that it has had enough; it is then separated, the legs of the mother having been previously shackled, by a very simple contrivance, to oblige her to stand still, and the dairy-maid milks off what was left by the calf. They proceed in this manner till the whole of the cows are milked, and thus do they obtain a small quantity of milk, it is true, but that of an exceedingly rich quality; which, in the hands of such as know how to manage it, is manufactured into the richest marrowy butter that can be anywhere met with. This richness of the Highland butter has been long remarked, and has been universally ascribed to the old grass that the cows feed upon in those remote glens; but it is in fact chiefly to be attributed to the practice here described, which has long prevailed in those districts.

Milk consists of three component parts, blended into one, and distinguished as *butyraceous*, or oily substance, of which butter is composed; *caseous* matter, from which cheese is formed; and *serum*, or whey. To separate these is the chief object of the dairy; and, with regard to butter, two different modes have been adopted: the one, from the *cream alone*: the other, from the *milk and cream united*. The former operation is thus performed.

The milk is carefully skimmed by means of a skimming dish, (if possible without spilling any upon the floor, because it will speedily taint the air of the room,) and the cream poured into a vessel, till enough be obtained for churning. When the cream has been collected, it should be put into a deep covered vessel, for the action of the air on the surface dries it; and it should be well stirred with a stick or spoon, once or twice a day, until made into butter. The time of keeping depends on the weather: if the cream from each milking be kept separately, it may remain a week, in most seasons, without being injured; but if sweet cream be mixed with that which is sour, they ferment and soon become putrid. This is partly prevented by the stirring: but it is far better to keep the cream from every milking apart, and thus allow each to become sour of itself; and the contrary practice should never be adopted, unless it be intended to churn the moment the whole mass has become acid.

In different counties there are several variations in the making of this primary article of domestic consumption; and among these, the following is the method of preparing it, which is peculiar to the counties of Somerset, Cornwall, and Devon—where it is termed *clotted*, or *clouted cream*. The milk, when twenty-four hours from the cow, is put into a kettle over a slow fire, which should be hot enough to bring it *very near* to the boiling point in about *two hours*, and not less. A person (usually a child) is set to watch it; and the moment a bubble rises to the top, formed by the vaporized milk, the whole is taken off, and set to rest for twenty-four hours more. At the end of this time, if the quantity of milk be considerable, the cream will be an inch or more thick upon the surface. It is now divided with a knife into squares of a con-

venient size, and removed. The milk, remaining after the cream is taken off, contains little beside the watery particles in its original composition. The dairy-women, in the above mentioned counties, say that milk, thus treated, will yield one-fourth more cream than is produced in the common way, and that a few strokes of the churn will form such cream into excellent butter. At present this cream is chiefly confined to the breakfast table; it is excellent for use with coffee, but when put into tea, it injures its taste, by being instantly converted partially into butter which rises to the surface: when prepared as above, it will keep somewhat longer than common cream.

In the neighborhood of *Epping*, which has long been famous for the quality of its butter, the following is the common process:—the milk, after standing twenty-four hours, is *fleeted*, or skimmed, and the skimmed milk is drawn off into vessels of an increased depth, which is called doubling. There it remains for twelve or twenty-four hours more, as the weather permits, during which time, as the cream rises, it is fleeted two or three times. It is then trebled, or put into deep tubs, where it is again occasionally skimmed, and kept so long as any appearance of cream is found to form on the surface. The butter made from these after-fleetings is, however, of a paler color and inferior quality to that made from the first cream; it is, therefore, usually churned apart. In making the first quality, when the butter is come, the dairy-woman throws it first into clear water, and then upon a board, and with her hand squeezes out all the water; sprinkling, at the same time, a little salt over the whole mass, which is then divided into pounds, and they, as they are weighed, are again squeezed and rolled out to the length of about fourteen inches. So far, the method nearly accords with that in most other districts; but there is this peculiarity in the management of the *Epping* dairy-women, that they consider a small proportion of acid, either natural or artificial, necessary to ensure a good churning; for which purpose they either mix sour cream with the sweet, or they employ lemon juice, and sometimes rennet. The practice merits attention on dairy farms which possess pasture of a short and sweet nature; but where the herbage is coarse, or the cows are fed on roots, or other succulent artificial food, the fresher the cream is churned, the better will be the butter.

With respect to the *operation of churning*, we would particularly remark, that it ought to be regularly continued, till the butter is *come*, or formed; for, if the motion be, in summer, too quick, the butter will, in consequence, ferment and become ill-tasted; and, in winter, it will *go back*. In hot weather, the business of churning may be much facilitated, by immersing the pump-churn (if such be employed) about one foot deep into a vessel of cold water, and continuing it there till the butter is made. Where other churns are made use of, the addition of one or two table-spoonsful of distilled vinegar, after the cream has been considerably agitated, will, it is said, produce butter in the course of an hour. It should, however, be observed, that the temperature of the milk should always be maintained at from 70 to 75 degrees of Fahrenheit's thermometer; and, therefore, in cold weather, it is sometimes necessary to add as much warm water as will raise it to that height. This

should be done, too, immediately after the lapper has been broken in the churn; and it should be poured in gradually by one person, while another is churning; for if poured in either too suddenly, or too hot, it will wet a portion of the butyraceous substance. It should also be observed, that when the milk has been either too much heated or too quickly churned, it becomes soft and of a pale color. From two to three hours is the usual time required for churning milk, but this depends on various circumstances of quantity, quality, and season; much less is requisite for cream, and least of all for that which is clouted.

After the butter is formed, the usual practice is to *wash it* in several waters till all the milk is removed; but care should be taken not to knead or beat it immediately, as it would be thus rendered tough, and the less it is handled, after being once made, the better. Some advise the milk to be forced out of the cavities of the butter by means of a flat, wooden ladle, furnished with a short handle; but, although the beating of butter up by the hand is an indelicate practice, it is yet so established in all dairies, and so much the most easy and effectual, that any attempt to abolish it may be considered hopeless. As it is hurtful to the quality of the butter to pour much cold water on it during this operation, the butter, if too soft to receive the impression of the mould, may be put into small vessels, and these be permitted to float in a trough of cold water beneath the table, *without wetting the butter*, which will soon become sufficiently firm. Or, when butter is first made, after as much of the milk has been got out as possible, it may be thinly spread on a marble slab, and the remaining moisture be absorbed by patting it with clean dry towels.

On the *making up of butter*, and particularly on the admission of water, whether warm or cold, into the churn, the following pertinent observations occur, in the Agricultural Survey of Sussex, on the dairy system of that county:—"Water is well known to be a great dissolvent; at least, if it be not essentially so, it serves as a conductor to air, which is universally such. Fresh butter then, in consequence of imbibing water, and water being saturated with air, is always in a progressive state of decay. Not so when water is excluded; its oleaginous parts are admirably calculated to secure it from putrefaction: and it is not improbable that butter might be made with as little trouble as the present method, to keep the whole year fresh and sweet, with the least particle of salt, solely by the exclusion of water. In order to effect this, the floor of the dairy should be kept perfectly dry, for water thrown down in hot weather will assuredly rise again in steam, and affect the milk with its humidity. The vessels used for holding the milk, the churn, and all the dairy utensils, after being first washed clean, should then be rinsed a first and second time with sweet milk—a cruet, washed ever so clean with water, will cause vinegar to become dreggy; but if rinsed with a little of the same, will always appear limpid and clear. No water to be put in with the cream when it is churned. The butter, as it is taken out, to be put into a tray, full of holes, and placed over any other vessel; but not to be squeezed into lumps, as it will drain the better for being loose in its texture. It should then (after having well drained) be removed to a tray without holes, and be kneaded with the hands

(first rinsed in whey) and formed into a thin flat cake, slightly sprinkled with salt, and left in that state for about half an hour; by which time the salt will have extracted the whey, and it may be made up in the usual manner."

Butter, thus freed from the remaining milk, is called *fresh butter*; and, when sold on the spot or in neighboring markets, it is formed into rolls weighing half a pound or a pound, or into lumps of 24 ounces, termed *dishes* in Somersetshire and some other parts of England. But where it is intended to be kept, or sent to a distance, it is salted by the process immediately to be described, and is put into casks, which contain respectively 28, 56, or 84 lbs., and usually denominated half firkins, firkins, and tubs. Previously to putting the butter into these vessels, especial care must be taken that they be well seasoned by frequent washing and exposure to the air for two or three weeks. As it is very difficult to season new firkins, it will always be preferable to employ those which have been already used, where they can be returned to the dairy owner. The most speedy method of seasoning firkins is, by the use of unslaked lime, or a large quantity of salt and water well boiled; with which they should be repeatedly scrubbed, and afterwards thrown into cold water, to remain there three or four days till wanted. They should then be scrubbed as before, and well rinsed with cold water; and, before the butter is put in, every part of the inside of the firkin must be well rubbed with salt.

The ordinary process of *salting butter*, after the milk has been forced out of it in the manner already described, is, to work into the butter one or two ounces of salt, so thoroughly that it shall be equally incorporated with the mass; for if it be not equally mixed in every part, the butter acquires two colors, becoming yellow where the salt has fallen, and white where it has not, or in some places is termed "pyety" or "pinsowed." The salt employed for this purpose should be of the purest kind, well dried and broken down, but not completely pulverized. Dr. Anderson, however, recommends the following preparation, which he has experienced to be much superior, as it not only prevents the butter from becoming in any degree tainted or rancid, but also improves its look or appearance, while it imparts a sweeter or richer taste than could have been effected by the use of common salt only.

Let two parts of the best common salt, sugar and saltpetre of each one part, be completely blended together by beating, and add one ounce of this mixture to every pound of butter; incorporate it thoroughly in the mass, and close it up for use.

It will be necessary, however, to keep butter, thus prepared, for two or three weeks before it is used, otherwise it will not taste well; but, if properly cured, according to the hints above given, Dr. Anderson states, that it will continue so perfectly sweet for three years, as not to be distinguished from newly-made and salted butter. In Holland, it is said, that the salt for butter that is intended to be kept, is mixed with the milk before it is churned, by which means both its flavor and conservative qualities are more effectually imparted. We cannot vouch either for the practice or its effects; but it certainly is worth a trial.

The best butter is that made during the sum-

mer; but, by adding a certain portion (which experience only can determine) of the juice expressed from the pulp of carrots, to the cream previously to churning, winter-made butter will acquire the appearance and flavor of butter that has been churned during the prime part of the summer season.

When butter is to be exposed to the heat of a warm climate, it should be purified by melting, before it be salted and packed up. For this purpose, Dr. Anderson directs it to be put into a close vessel, and this into another containing water, which must be gradually heated until the butter be thoroughly melted. In this state it must continue for some time, when the impure parts will subside, and leave at the top a perfectly pure transparent oil; which, on cooling, will become opaque, and assume a color nearly resembling that of the original butter, except that it will be a little paler, and of a firmer consistence. This refined butter is then to be separated from the dregs, salted, and put up in the same way as the other butter: it will continue much longer sweet in hot climates, as it retains the salt better. Butter may also be preserved sweet without salt, by adding a certain quantity of fine honey, in the proportion of one ounce of the latter to a pound of butter, and mixing them thoroughly, so that they may be perfectly incorporated. A mixture of this sort has a sweet pleasant taste, and will keep for years without becoming rancid.

The process of making butter from the milk and cream together, which is much practised in Scotland and Ireland, is usually as follows:

The milk is placed in pans, from three to six inches deep, and left, from twelve to twenty-four hours; until it has cooled, and the cream has risen to the surface. It is then emptied (before it has become sour) into a well-scalded vat, sufficiently large to contain the whole of that milking; or of two milkings, if both are equally cool and sweet; but if there be the least approach to acidity in either, they are kept separate. The whole of the milk is then left until it becomes thick and sour before it is churned; but it is allowed to become so of itself and is not forced by the mixture of sour with sweet. Care is also taken not to break the coagulum, or *lapper*, as it is technically called, until it is churned: and it is found that the milk may thus be safely kept, from a day to a week, until sufficient is collected to form a churning. With due attention to these points, the butter produced is always high-flavored, and the butter-milk that remains, though acid, is pleasant and nutritive, and, if kept cool, will retain those qualities for a considerable time unimpaired; but if, on the contrary, sour milk be mixed with sweet, or the *lapper* be broken before churning, fermentation will be excited; the milk runs into curds and whey; the butter acquires a bad taste and smell, as well as an ill color; and the butter-milk loses its most valuable properties.*

Such is the practice in the best Scotch dairies: in Ireland, where the butter is generally of very fine quality, the common method is, to churn the milk and cream together: the milk being allowed to stand so long as it wheys on the top. It is thus said to produce more butter than in the usual mode

of churning the cream alone; and the butter-milk is preferred, by those who are accustomed to it, to skim-milk.

In Holland, the mode is somewhat different. There the milk, when cold, is put into a vat, and frequently stirred to prevent the cream from separating from the milk; and this is continued until the milk becomes so thick that the ladle stands erect in it. It is then churned; and cold water is added, in order the better to effect the separation of the butter. In this manner, the Dutch dairy-women also say, that more butter is obtained from the milk than in any other; and they also insist, that both the butter and the butter-milk are better than in any mode adopted in this country. This, however, is the opinion of the advocates of each different system; all of whom consider their own as the best; and, without comparative experiments, it is difficult to decide which has the advantage. The chief distinction lies between the two methods of churning, either the cream alone, or the cream and milk together; the latter, as we have already seen, is said to produce most butter; but it excludes the making of skim-milk cheese, which is a profitable object of dairy economy; and, if it be true, that more butter is got in this manner than in the other, it must also be evident, that there cannot be so much nutriment left in the butter-milk as in the skim-milk. In Scotland and Ireland, however, butter-milk is an object of great consumption as food for the peasantry, by whom it is preferred to skim-milk, and it can be preserved longer for use. In large dairies, the labor of churning the milk and cream together is very considerable; but, on the other hand, so is the trouble of skimming, when the cream is to be churned alone. As the object of both processes is to extract as much as possible of the substance of the milk, it would probably be found, on a minute comparison, that, whether that be effected in the shape of butter, of cheese, or of nutritive food left in the milk or whey, either, when equally well performed, would be nearly equally profitable.

[To be continued.]

REMARKS ON MR. SPALDING'S ESSAY ON THE INTRODUCTION AND CULTURE OF COTTON.

To the Editor of the Farmers' Register.

In common with your other readers, I have been interested by the perusal of an article, (from the Southern Planter) in the number of your journal for November last, from the pen of Mr. Spalding of Sapelo, Ga., relating to the introduction of cotton into the United States—the progress of its culture, &c. The readers of the agricultural journals in this country are largely indebted to Mr. Spalding. His authority on the subject, especially the sea island race, is well known. I have thought it worth your notice, and I hope, in relation to the subject of cotton. After enumerating the cotton plant, *Gossypium baccatum*, *arborescens*, *peruvianum*, *egyptium*, *indicum*, *georgicum*, *theobroma*, *theophrasti*, *longum*, *Barb.*

* Aiton on the Dairy Husbandry of Ayrshire, chap. III. sect. 3.

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From the Genesee Farmer.

HUSSEY'S MACHINE FOR HARVESTING WHEAT.

The machine has been very fully tried, and I am gratified to be able to say, that it has as fully succeeded. Hundreds of farmers, from the different towns of this and the adjoining counties, have witnessed its operations, and all have not only expressed their confidence in its success, but their gratification in the perfection of its work.

As every inquirer asks the same series of questions, I presume your readers will have a like course of thought, and wish for satisfaction in the same particulars. To give them this, I will write them in their order, and give the answers.

Does the machine make clean work?

It saves all the grain; to use the language of a gratified looker on, an old and experienced farmer, "it cheats the hogs."*

Does the machine expedite the work?

What the machine is capable of accomplishing, we who have used it can hardly say, as we had no field, in fit order, large enough for a fair trial through a whole day; and can only say what it has done. Five acres of heavy wheat on the

*The hogs are the gleaners in this section of country.

Genesee flats were harvested in two hours and a quarter.

In what condition is the wheat left, and how is the work done, where the grain is lodged?

The machine leaves the wheat in gavels large enough for a sheaf, and where the grain stands well enough to make fair work with a cradle, it leaves the straw in as good condition to bind as the gavels of a good reaper. Whether the grain stands or is lodged is of little consequence, except as to the appearance of the sheaf, and the necessity of saving more straw, when lodged, than is desirable. The condition of the sheaf, when the grain is lodged, depends much upon the adroitness of the raker.

What number of hands, and what strength of team is necessary to manage the machine advantageously?

Two men, one to drive the team and the other to rake off the wheat, and two horses work the machine; but when the grain is heavy, or the land mellow, a change of horses is necessary, as the gait of the horses is too rapid to admit of a heavy draft. The horses go at the rate of four to five miles an hour, and when the growth of straw is not heavy, a fair trot of the team is not too much.

Is the machine liable to derangement and destruction from its own motion?

This is a question which cannot be so directly answered as the others. We have only used the machine to cut about fifty acres, and have had no trouble; judging from appearance so far, should say it was as little subject to this evil as any machinery whatever. The wear upon the cutting part being so little as to require not more than fifteen minutes sharpening in a day, there is no loss of time on this score.

Is the sheaf a good one to thrash?

The man who has fed the thrashing machine with the grain of twenty acres cut by this machine, says the sheaves are much better than those of cradled grain, and quite as good as those of a reaper.

There is one more advantage beyond ordinary inquiries, of consequence where so much grain is raised as in this valley; be the grain ever so ripe, there is no waste of grain by any agitation of the straw, and all the waste which can take place must arise from the handling and shaking in binding.

I am yours, &c.

WILLIAM C. DWIGHT.

Moscow, Liv. co., Nov. 14th, 1834.

N. B. The machine we used was intended only for upland; but by some little alterations and additions, we used it with equal facility on all kinds of soil; and it can be used on any farm so clean from stumps and stones as not to endanger the blocking of the wheels.

From the Library of Useful Knowledge, Farmer's Series.

GENERAL HISTORY OF THE HORSE.

[Continued from page 547, Vol. II.]

The East Indian Horse.

We will now travel further eastward, and look at the breeds of horses in our Indian possessions. First, we have the *Toorky*, originally from a *Toorkoman* and a Persian, beautiful in his form, grace-

ful in his action, and docile in his temper. It is said that, when skillfully managed, the grandeur and stateliness of his carriage are equal to what the warmest imagination can conceive of the horse: his spirit rising as his exertions are required, he exhibits to his beholders an appearance of fury in the performance of his task, yet preserving to his rider the utmost playfulness and gentleness.

Next comes the *Iranee*, well limbed, and his joints closely knit, and particularly powerful in the quarters, but with scarcely sufficient spirit, and his ears large and loose.

The patient and docile *Coxakee* is deep in the girth, powerful in the fore-arm, but with large head, and sadly cat-hammed; hardy, and calculated for long journeys and severe service.

The *Mojinnis* have spirit, beauty, speed, and perseverance.

The *Tazsee* is slight, hollow-backed, and, for that reason perhaps, although deficient in strength and leaving as it were his hind legs behind him, and likewise irritable in temper, yet sought after on account of the peculiar easiness of his pace.

A sale of horses near the Company's stud at Hissar, is thus described by an excellent judge. "Not less than one thousand horses were shown. They were all above fourteen hands and a half in height, high-crested, and showy-looking horses. The great defect seemed a want of bone below the knee, which is indeed general to all the native horses throughout India; and also so great a tendency to fulness in the hocks, that, in England, it would be thought half of them had blood spavins."

The Chinese Horse.

This breed is small, weak, ill-formed, without spirit, and altogether undeserving of notice.

The Persian Horse.

Returning westward we find the Persian next in estimation, and deservedly so, to the Arabian. The head is almost equally beautiful, the crupper superior; he is equal in speed, but far inferior in endurance. The whole frame is more developed than in the Arabian.

The Persian horses were celebrated for many a century before the Arabians were known, or even existed. They constituted, in ancient times the best cavalry of the east. The native Persian was so highly prized, that Alexander considered one of them the noblest gift he could bestow, and when the kings of Parthia would propitiate their divinities by the most costly sacrifice, a Persian horse was offered on the altar. An entertaining traveller (Sir R. Ker Porter) bears testimony that they have not now degenerated. He gives the following account of this breed.

"The Persian horses never exceed fourteen or fourteen and a half hands high, yet certainly, in the whole, are taller than the Arabs. Those of the desert and country about Hillah run very small, but are full of bone and of good speed. General custom feeds and waters them only at sun-rise and sun-set, when they are cleaned. Their usual provender is barley and chopped straw, which, if the animals are piqueted, is put into a nose-bag and hung from their heads; but if stabled, it is thrown into a small lozenge-shaped hole left in the thickness of the mud-wall for that purpose, but much higher up than the line of our mangers, and there the animal eats at his leisure. Hay is a kind of food not known here. The bedding of the horse

consists of his dung. After being exposed to the drying influence of the sun during the day, it becomes pulverized, and, in that state, is nightly spread under him.* Little of it touches his body, that being covered by his clothing, a large *nummud* from the ears to the tail, and bound firmly round his body by a very long surcingle. But this apparel is only for cold weather; in the warm season the night-clothes are of a lighter substance, and during the heat of the day, the animal is kept entirely under shade.

"At night he is tied in the court yard. The horses' heads are attached to the place of security by double ropes from their halters, and the heels of their hinder legs are confined by cords of twisted hair, fastened to iron rings, and pegs driven into the earth. The same custom prevailed in the time of Xenophon, and for the same reason, to secure them from being able to attack and maim each other, the whole stud generally consisting of stallions. Their keepers, however, always sleep on their rugs amongst them to prevent accident; and sometimes, notwithstanding all this care, they manage to break loose, and then the combat ensues. A general neighing, screaming, kicking, and snorting, soon rouses the grooms, and the scene for awhile is terrible. Indeed no one can conceive the sudden uproar of such a moment who has not been in Eastern countries to hear it, and then all who have, must bear me witness that the noise is tremendous. They seize, bite, and kick each other with the most determined fury, and frequently cannot be separated before their heads and haunches stream with blood. Even in skirmishes with the natives, their horses take part in the fray, tearing each other with their teeth, while their masters are in similar close quarters on their backs."

His description of a Persian race does not altogether remind us of Newmarket or Doncaster.

"My curiosity was fully on the spur to see the racers, which I could not doubt must have been chosen from the best in the nation to exhibit the perfection of its breed before the sovereign. The rival horses were divided into three sets, in order to lengthen the amusement. They had been in training for several weeks, going over the ground very often during that time; and when I did see them, I found so much pains had been taken to sweat and reduce their weight, that their bones were nearly cutting the skin. The distance marked for the race was a stretch of four-and-twenty miles, and, that his majesty might not have to wait when he had reached the field, the horses had set forward long before, by three divisions, from the starting point, (a short interval of time passing between each set,) so that they might begin to come in, a few minutes after the king had taken his seat. The different divisions arrived in regular order at the goal, but all so fatigued and exhausted, that their former boasted fleetness hardly exceeded a moderate canter when they passed before the royal eyes."

In Circassia almost every family of distinction, whether of princes or nobles, boasts of possessing

a peculiar race of horses, which, when young, are burned on the buttock with a particular mark. On this occasion, they act with the most scrupulous adherence to custom, so that a person who should attempt to burn a character expressing noble descent, on a filly of a common race, would, for such forgery, forfeit his life. The most celebrated race of Circassian horses has received the name of Shalokh, and is in the exclusive possession of the Tau Sultan family. This race is valuable for its strength and swiftness, more than its peculiar beauty. Its distinguishing mark is a full horse-shoe, without an arrow.

The Toorkoman Horse.

Turkistan is that part of South Tartary, north-east of the Caspian sea, and has been celebrated from very early times, for producing a pure and valuable breed of horses. They are called *Toorkomans*. They are said to be preferable even to the pure Persians, for service. They are large, standing from fifteen to sixteen hands high; swift, and inexhaustible under fatigue. Some of them have travelled nine hundred miles in eleven successive days. They, however, are somewhat too small in the barrel—too long on the legs—occasionally ewe-necked, and always have a head out of proportion large; yet, such are the good qualities of the horse, that one of the pure blood is worth two or three hundred pounds, even in that country.

Captain Fraser, who is evidently a good judge of the horse, (in his *Journey to Khorasan*) thus relates the impression which they made on him: "They are deficient in compactness. Their bodies are long in proportion to their bulk. They are not well-ribbed up. They are long on the legs—deficient in muscle—falling off below the knee;—narrow chested—long necked—head large, uncouth, and seldom well put on. Such was the impression I received from the first sight of them, and it was not for some time that their superior valuable qualities were apparent to me."

The Tartar and Calmuck Horse.

The horses of the other parts of Tartary, comprehending the immense plains of Central Asia, and a considerable part of European Russia, are little removed from a wild state; they are small and badly made; but capable of supporting the longest and most rapid journey, on the scantiest fare. The foals, from the earliest period, are exposed to the inclemency of the weather, have little to eat, and follow their dams in the longest excursions, and, therefore, soon acquire a very great power of sustaining fatigue. They must be hardy for another reason. The Tartars live much on the flesh of horses, and, consequently, those animals that are unable to support the labor of their frequent rapid emigrations are soon destroyed, and only the more vigorous preserved.

The horses, which range at large over the plains, are divided into herds, at the head of which are placed two stallions, who carefully prevent them from intermingling with each other, and it is rarely that a foal is lost. On the approach of a strange herd, the stallions drive their own into a close body, place themselves in front, and, if necessary, attack and drive off the others. As the stallion-foals grow up, they are driven away from the herd, and are seen straggling about at a distance, until they

*It is the usual flooring of the staple and the tent. The united influence of the sun and air deprive it of all unpleasant odor, and when from use it becomes a second time offensive, it is again exposed to the sun, and all unpleasant smell once more taken away.

are strong enough to form herds of wild mares for themselves.

These horses, or those of a similar breed and habits, were beaten by not the first rate English blood-horses, in a race which fairly put to the test both their speed and stoutness. On the 4th of August, 1825, a race of the cruel distance of more than forty-seven miles was run between two Cossack and two thorough-bred English horses—*Sharper* and *Mina*. The most celebrated Cossack horses from the Don, the Black Sea, and the Ural, were sent; and, after numerous trials, the best were selected. On starting, the Cossacks took the lead at a moderate pace, the English following at about three or four lengths, but before they had gone half a mile, the stirrup-leather of *Sharper* broke, and he ran away with his rider, followed by *Mina*, and they went more than a mile, and up a steep hill, before they could be held in.

Half the distance was run in an hour and four minutes. Both the English horses were then fresh, and one of the Cossacks. On their return, *Mina* fell lame, and was taken away. The Cossack horse, likewise, began to flag, when the accompanying Russians began to drag him on by the bridle, throwing away the saddle, and putting a mere child on his back. *Sharper*, likewise, evidently showed the effects of the pace at which he had gone when running away, and was much distressed. The Cossacks then had recourse to foul play, and actually *carried on* their horse; some dragging him on by a rope, and the bridle at his head; and others pulling him on by the tail, and riding alongside of his quarters to support him, and relieving each other at this fatiguing work. *Sharper* did the whole distance in two hours and forty-eight minutes, and the Cossack horse was warped in eight minutes after him. At starting, the English horses carried full three stone more than the Cossacks; and during the latter half of the race, a mere child had ridden the Cossack.

The Turkish Horse.

The Turkish horses are descended principally from the Arab, crossed by the Persian and certain other bloods. The body, however, is even longer than the Arabian's, and the crupper more elevated. They have contributed materially to the improvement of the English breed. The *Byerley* and the *Helmusley Turk*, are names familiar to every one conversant with horses, and connected with our best blood.

The learned and benevolent *Busbequius*, who was ambassador at Constantinople in the seventeenth century, gives the following account of the Turkish horses. Our grooms, and their masters too, may learn a lesson of wisdom and humanity from his words.

"There is no creature so gentle as a Turkish horse, nor more respectful to his master, or the groom that dresses him. The reason is, because they treat their horses with great lenity. I myself saw, when I was in Pontus, passing through a part of Bithinia, called *Axilos*, towards *Cappadocia*, how indulgent the countrymen were to young colts, and how kindly they used them soon after they were foaled. They would stroke them, bring them into their houses, and almost to their tables, and use them even like children. They hung something like a jewel about their necks, and a garter, which was full of amulets against

poison, which they are most afraid of. The grooms that dress them are as indulgent as their masters; they frequently sleek them down with their hands, and never use a cudgel to bang their sides, but in cases of necessity. This makes their horses great lovers of mankind; and they are so far from kicking, wincing, or growing untractable by this gentle usage, that you will hardly find a masterless horse amongst them.

"But, alas! our christian grooms' horses go on at another rate. They never think them rightly curried till they thunder at them with their voices, and let their clubs or horse-whips, as it were, dwell on their sides. This makes some horses even tremble when their keepers come into their stable; so that they hate and fear them too. But the Turks love to have their horses so gentle, that at the word of command they may fall on their knees, and in this position receive their riders.

"They will take up a staff or club upon the road with their teeth, which their rider has let fall, and hold it up to him again; and when they are perfect in this lesson, then, for credit, they have rings of silver hung on their nostrils as a badge of honor and good discipline. I saw some horses when their master was fallen from the saddle stand stock still without wagging a foot till he had got up again. Another time I saw a groom standing at a distance in the midst of a whole ring of horses, and, at the word of command, they would either go round or stand still. Once I saw some horses when their master was at dinner with me in an upper room, prick up their ears to hear his voice, and when they did so, they neighed for joy."

The German Horse.

The German horses are generally large, heavy, and slow. The Hungarian may be an exception, being lighter, speedier, and giving greater proof of eastern blood.* Every part of the continent, however, following the example of England, has been diligently engaged in the improvement of its breed, and the German and Prussian horses are now better proportioned, and have considerable endurance, but are still deficient in speed. The Prussian, German, and the greater part of the French cavalry are procured from *Holstein*. They are of a dark glossy, bay color, with small heads, large nostrils, and full dark eyes, the fire and clearness of which seem to denote the inward spirit of the animal. They are beautiful, active, and strong.

The Swedish, Finland, and Norwegian Horse.

Of the *Swedish* horses, *Clarke*, in his "*Scandinavia*," says, that they are small but beautiful, and remarkable for their speed and spirit. Those of *Finland* he describes as yet smaller, not more than twelve hands high, beautifully formed, and very fleet. The peasants take them from the forests when they are wanted for travellers. Although apparently wild, they are under perfect control, and they trot along with ease at the rate of twelve miles an hour."

* *M. de Buffon* strangely affirms, that the *Hussars* and *Hungarians* slit the nostrils of their horses with a view to increase their wind, and to prevent their neighing; and that *Hungarian*, *Croatian*, and *Polish* horses continue to old age to have the mark in all their fore-teeth.

The following story is told of one of the *Norwegian* horses. His master had been dining at a neighboring town, and, when it was time to return, had exceeded so much, that he could not keep a firm seat in his saddle. The horse regulated himself, as well as he could, according to the unsettled motion of his rider, but, happening to make a false step, the peasant was thrown, and hung with one foot entangled in the stirrup. The horse immediately stopped, and twisting his body in various directions, endeavored to extricate his master, but in vain. The man was severely hurt, and almost helpless; but the shock had brought him to his senses. The horse looked at him as he lay on the ground, and, stooping, laid hold of the brim of his hat; and raised his head a little; but the hat coming off, he fell again. The animal then laid hold of the collar of his coat, and raised him by it so far from the ground, that he was enabled to draw his foot out of the stirrup. After resting awhile he regained the saddle, and reached his home. Grateful to his preserver, the man did, what every good feeling bid him—he cherished the animal until it died of old age.

Many an English farmer owes a considerable debt of gratitude to his intelligent and faithful servant, who has taken care of him when he was unable to take care of himself, and, possibly, has preserved his life. Let him repay the debt by kinder usage.

The Iceland Horse.

There are numerous troops of horses in this cold and inhospitable country, descended, according to Mr. Anderson, from the *Norwegian* horse, but, according to Mr. Hottelbow, being of *Scottish* origin. They are very small, strong, and swift. There are thousands of them in the mountains which never enter a stable, but instinct or habit has taught them to scrape away the snow, or break the ice, in search of their scanty food. A few are usually kept in the stable, but when the peasant wants more he catches as many as he needs, and shoes them himself, and that sometimes with a sheep's horn.*

The Flemish and Dutch Horse.

The *Flemish* and *Dutch* horses are large, and strongly and beautifully formed. We are indebted to them for some of the best blood of our draught-horses, and we still have frequent recourse to them for keeping up and improving the breed. They will be more particularly described when the cart-horse is spoken of.

The French Horse.

France contains, like England, numerous breeds of horses and considerable attention has lately been paid to their improvement; but they are far inferior to ours in beauty, fleetness, and strength. The provinces of *Auvergne* and *Poitou* produce good ponies and galloways; but the best French horses are bred in *Limousin* and *Normandy*. From the former district some excellent saddle-horses and hunters; and from the latter a stronger species, for the road, the cavalry, or the carriage. The *Norman* horses are now much crossed by our hunters, and occasionally by the thorough-bred; and the *English* roadster and light

draught-horse has not suffered by a mixture with the *Norman*.

The Spanish Horse.

Spain was early celebrated for her breed of horses. The *Andalusian* charger and the *Spanish jennet* are familiar to all readers of romance. The subjugation of so great a portion of the peninsula to the *Moorish* sway, by introducing so much of the *Barbary* blood, mainly contributed to the undisputed excellence of the *Spanish* horse. One breed, long in the limbs, and graceful in all its motions, was the favorite war-horse of the knight; while another race, carrying the esquire, although inferior in elegance, possessed far more strength and endurance. The *Spanish* horse of the present day is not much unlike the *Yorkshire* half-bred; perhaps with flatter legs and better feet, but far inferior figure.

The Italian Horse.

The *Italian* horses were once in high repute, particularly the *Neapolitans*; but like every thing else in those mismanaged countries, they have sadly degenerated. One circumstance has mainly contributed to this falling off in reputation and value, viz. that the breed has been kept up by occasional intermixture, not of *Eastern*, but of *European* blood. A few of the *Neapolitan* horses, from their superior size and stateliness, are well adapted for the carriage.

The American Horse.

In the extensive territory and varied climate of the *United States*, several breeds of horses are found.

The *Canadian* is found principally in *Canada*, and the *Northern States*. He is supposed to be of *French* descent, and many of the celebrated *American* trotters are of this breed. We will speak of some of them when we describe the paces of the horse.

The *Conestoga* horse is found in *Pennsylvania*, and the middle states—long in the leg and light in the carcass—sometimes rising seventeen hands, used principally for the carriage; but when not too high, and with sufficient substance, useful for hunting and the saddle.

The *English* horse, with a good deal of blood, prevails in *Virginia* and *Kentucky*; and is found, to a greater or less degree, in all the states. The *Americans* have, at different times, imported some of the best *English* blood. It has been most diligently and purely preserved in the *Southern States*. The celebrated *Sham*, the best horse of his day, and equalled by few at any time, was the sire of the best *Virginian* horses; and *Tally-ho*, a son of *Highflyer*, peopled the *Jerseys*.

In the back-settlements, and in the south-western states, is a horse resembling the wild horse of the *Pampas*, already described, and evidently of the same origin.

AN INQUIRY.

To the Editor of the *Farmers' Register*.

Seeing that it is becoming somewhat common to make application for agricultural information through the columns of your paper, I shall take the liberty of asking, what is the most effectual and shortest method of restoring to fertility, worn,

*Kerguelen's Voyage to the North.

galled and gullied land? Cannot the intelligent and skilful proprietors of Cloverton and Pen Park give to the public a minute and circumstantial account of the management by which the above estates were "created anew?"—for there are many in this part of the state, which, to all the means now in use among us, are past the healing art. I observed in their respective communications to the Albemarle Agricultural Society, they recommended deep ploughing, as a most effective agent in the work of improvement. As deep ploughing is a comparative term, I for one, should be glad to know, what is considered by them, deep ploughing, in specific inches; or whether the depth of the ploughing is to be dependent on the natural depth of soil?

A SEEKER OF LIGHT.

From Loudon's Magazine.

COILING SYSTEM OF CULTIVATING THE VINE IN POTS.

By MR. JOHN MEARNS, F. H. S. Gardener to his Grace the Duke of Portland, Welbeck, Nottinghamshire.

Sir—As I have communicated an account of my coiling system of cultivating the vine in pots to several persons, and have also given a statement of my experiments to the London Horticultural Society, I feel it to be a duty also to lay my practice before you.

This coiling system is certainly a completely new feature, and, I think, a very valuable one, in the art of grape-growing. Is it not a matter of great importance that, in consequence of my discovery, a gardener, who may go to a situation, in the autumn, where no grapes have previously been growing, may be enabled to produce there easily, for the ensuing season, from five hundred to one thousand bunches of fine grapes? All that are wanting to enable any gardener, so circumstanced, to do this, are, the prunings of the vines from any garden, that would otherwise be thrown away, and, of course, a convenient frame, pit, or house, for growing them in. If abundance of shoots can be procured, and there is a sufficient extent of frames, &c. either temporary or permanent, two, three, or five thousand bunches may thus be produced in a garden where grapes were never seen before.

The coiling system is nothing more than taking a long shoot or cutting from a vine, cutting out all the buds except a few at the upper end, and then beginning at the lower end, and coiling the shoot round and round, say from three to six or eight times, the inside of a pot of twelve or fourteen inches or more in diameter. The shoot may be of any length, from six feet to thirty feet, and it may be entirely of last year's wood; or the greater part of it may be of old wood, provided three or four feet at the upper end be of new wood; because, as every gardener knows, the buds from young wood are more certain than those from old wood of producing blossoms the first year. The vine being coiled round in the pot, and plenty of drainage being put in the bottom, take care that the end of the shoot left out of the pot, on which the fruit is to grow, be not injured at the point where it separates from the coil. This shoot may be two or three feet long; and, to keep it steady, it may be tied to a stake, or coiled round two or three stakes. After this, fill up the pot with a rich

loamy soil, pressing it firmly against the coil, as if you were making firm the end of a cutting. Unless this is done in such a manner as to bring every part of the coil in close contact with the soil, it will not root so readily as it otherwise would do. The next operation is, to wrap up all that part of the stem which is above the pot with moss, and this moss must be kept constantly moist till the grapes are formed. The pot should now be plunged in bottom heat either in a pit or forcing-house; but, wherever it is plunged, care must be taken to regulate the temperature of the atmosphere of the house, in such a manner as to prevent the top of the vine from being excited before the roots. If this should happen, the young shoots produced will soon wither for want of nourishment. Abundance of air, therefore, should be given for several weeks, so as never to allow the temperature of the atmosphere of the house, frame, or pit, to exceed forty-five or fifty degrees, while the temperature of the medium in which the pots are plunged may be as high as sixty-five or seventy degrees. When, by examination, you find that fibres have protruded from the coil, the temperature of the atmosphere may then be gradually raised, when the buds will break and the shoots will grow apace.

The shoots proceeding from that part of the stem above the pot, should be led up to within eight or ten inches of the glass, and there trained, at that distance from it, towards the back of the pit or house. It is needless to state to the practical gardener, that each shoot will require to be shortened, freed from laterals, &c. Each vine will produce from three to twenty or more bunches, according to the length of coil and variety of grape. I have now (Jan. 17, 1834) upwards of two hundred coiled branches in pots, and nearly fifty of them in action; some with twenty bunches of fine grapes on them.

I was asked the other day, whether vines so treated would not require frequent shiftings into larger pots; or, at least, to be shifted once a year. To this I answered, that while we had a plentiful supply of prunings from our own vines, or could procure them from those of our friends, the best mode would be to treat the plants, after they had borne one crop, as we do the roots of asparagus and other plants that we force; that is, to throw them away. If, however, you should wish to keep the coiled plants a second year, and the pots should be found to be too full of roots, turn out the ball, shake the soil from the coil, and cut away all the roots close to the shoot; then re-pot it as before. If this be done in winter, the plant will produce an excellent crop the following season; probably a better one than if the roots were allowed to remain, and the ball shifted into a larger pot or box. The pot or box is in either case, soon filled with young vigorous fibres, like a hatch of young maggots, each eager for food, and consequently sending it up in abundance to supply the crop above. Can there be a doubt but that this is a far superior mode to keeping pots, or even fruit-tree borders, filled up with old inert roots?

Before my bunches are clearly developed, I have thousands of eager mouths or spongioles, extending along the coiled shoot, and each gaping for food; some of these rootlets are three feet long, and before the vines are out of blossom, many of them are six feet in length, and matted round and

round the pot. You will easily understand from this, how important it is to supply vines so treated with liquid manure, either by watering from above, or by a supply from a saucer or feeder from below.

Welbeck Gardens, Jan. 16, 1834.

Since we received the above account from Mr. Mearns, we have heard the article on the same subject, to which he alludes, read before a meeting of the horticultural society. In this paper, the names of a number of varieties are mentioned, which had been thus fruited; including the muscadines, black clusters, black Hamburg, black Damascus, black Tripoli, muscat of Alexandria, &c. Mr. Mearns also mentions that, hearing of a new and fine variety of muscat, called the Candia, which had been a few years ago introduced into the Duke of Buccleugh's gardens, at Dalkeith, he wrote last autumn to Mr. Macdonald, the gardener there, for some of the prunings of this vine, and that he had, at the time the paper was written, (Feb. 1834.) plants of the Candia at Welbeck, from coils of the prunings received, with numerous bunches of fruit on them, which would ripen in April and May next.

We regard this discovery of Mr. Mearns as one of considerable importance, not only as showing what may be done in the particular case of the vine, but as tending to familiarise practical gardeners with some points in vegetable physiology. It is clear that the coiled shoot is a reservoir of nutriment to the young growth, in the same manner as the tuber of the potato is an accumulation of nutriment for the young shoots, which proceed from its buds or eyes when planted. To a certain extent, long shoots of any tree whatever if buried in the soil, either coiled or extended, and two or three inches or feet of their upper extremities kept out of the ground, would produce leaves, blossoms, and even fruit, the first year: but those shoots, which, from their nature, do not freely emit fibres, or do not emit them at all, would perhaps not set their fruit; or might even cease to produce leaves in the course of a few months. The reason, in that case, would be, that the reservoir of nourishment soon becomes exhausted, if it is not supplied from the soil; and that the only mode by which the shoot can obtain nourishment from the soil is by means of fibres, which it has either no power of producing at all, or cannot produce in sufficient abundance. The advantages of the coiling system are, that an almost unlimited number of fibres or mouths are produced by it, in a very limited portion of soil; that this soil can be rendered of the most suitable descriptions for the given plant, supplied abundantly with liquid manure, and renewed almost at pleasure. The use of cutting off all these fibres or mouths, when they get too long, is merely to keep them within a limited space; for when a fibre elongates, unless it has at the same time, room to branch out, so as to produce other fibrils, it can take in no more nourishment than when it is short, say an inch long; because the nourishment is only taken in by the spongiole, or point of the fibre. The whole art of rapid cultivation, both in ligneous and herbaceous vegetables, proceeds on this principle. The Lancashire gooseberry grower has recourse to it, when he shortens the roots of his plants at a certain distance from

the stem, every two or three years; thus causing them to emit fibres, for which he prepares a circular trench of rich soil round each tree. Mr. Mearns's mode of treating the peach, and other fruit trees, and the mode of cultivating cabbages, and other plants of that kind, by picking out from the seed-bed, and transplanting and re-transplanting into rich soil, instead of sowing where the plants are finally to remain, all proceed on the principle of multiplying the mouths, and increasing the supply of rich food, within a limited space. The result of this is, both in ligneous and herbaceous plants, that maturity is obtained with less magnitude than in a natural state, and in a much shorter time. The essential principle is the abundant supply of rich nutriment; and the same principle produces exactly the same results in the animal kingdom. Hence the small-sized, early-fattening varieties of cattle, sheep, swine, &c.

Where a plant or animal is grown or reared chiefly to be consumed as food, the application of this principle seems desirable and advantageous; but when the natural character and beauty of the plant or animal are desiderata, a more natural mode of treatment, or one more resembling that which is generally followed, is requisite for attaining the end in view.

All intricate operations of culture, such as those of the coiling system, the chambering of the roots of trees, taking up and replanting, particular modes of training, ringing, &c. it should never be forgotten either by gardeners or their employers, are only calculated for places where abundance of men are kept, and where also there is considerable skill in at least one or two of these men. When these and similar operations are attempted in places where there are scarcely hands enough to keep the garden in order by the common practices, failure is certain to attend either the new practice or the old ones, and probably both.—CONDUCTOR.

From London's Magazine.

A DESCRIPTION OF A MODE OF CULTIVATING ONIONS.

By MR. WILLIAM WHIDDEN.

Sir—Your correspondent, John Mitchel, jun., treats on the culture of the onion. I write not to dissuade him from following the plans which his own observation has suggested to him, but to state my own experience on this subject, as it differs widely from his. In March, 1830, I lived as gardener to J. B. Praed, Esq. of Tyingham, Bucks; and, having occasion to make an asparagus bed, I resolved upon sowing onions, of the Deptford sort, in drills between the rows. The ground was not prepared in the way usual for asparagus, but turned over to the depth of one spade only. The soil being of a tenacious and cohesive quality, I used a quantity of coal-ashes and rotten dung; and all being in readiness for the asparagus, I proceeded to plant it in rows eighteen inches asunder, and the onions in drills between these rows. I finished each row as I proceeded, which caused a great deal of trampling, and the ground was remarkably hard after the whole was completed. When the crops began to grow, I thought of hoeing, thinning, &c.; but, being a native of Northampton, where some of the best onions in the kingdom are grown, I recollected seeing, at different times, onions growing in the hard walk, and

these the best sample of a whole acre. I accordingly resolved to let my crop take its chance. Weeding and thinning were performed by the hand, which greatly increased the solidity of the soil. My crop was pulled up without attention being paid to any particular time or form; the onions composing it were sound and good, while the crops of my neighbors were suffering from what are termed mouldy-nosed onions. I had several bushels from a small piece of ground, and was obliged to exchange with my neighbors for picklers. I presented Mr. Atkins, nurseryman, of Northampton, with twelve which weighed eleven pounds. I planted twenty-four of them the succeeding spring, for seed, which weighed nearly twenty-two pounds, and were shown to several friends before they were planted, who can testify the fact. I cannot say what quantity of seeds they produced, as I left my situation at that time.

A great deal has been said about growing large onions; but, according to my humble opinion, large onions are not the most desirable. From my experience (which, I confess, is not a lengthened one, as I am but a young gardener,) an onion from one to two inches diameter is the most profitable, of the readiest sale, and the best for gardeners and gentlemen. When a large onion goes into a gentleman's kitchen, it is cut, and a part only is used; the remainder loses its quality, and ultimately bears company with the peelings to the dung heap. I advise John Mitchel, if he wishes for large onions, to try as I have suggested above. His soil will suit every purpose. He will find an advantage in time; run no risk in displacing the roots, which is apt to check vegetation; and he will not be so likely to get disease in the crops, as the trampling forms gutters in which he can, if dry weather occur, put water, and supply the roots more gradually with moisture; or, if a continuance of rain should happen, these gutters will carry off the superfluous water.

Chicheley Hall, Bucks.

For the Farmers' Register.

TOBACCO CULTURE—NO. 4.

[Continued from p. 223, Vol. II.]

Stripping and pressing.

Stripping and pressing being the subject of my fourth number, (already too long delayed) the remarks thereon will conclude the practical part of the subject. As soon as tobacco is thoroughly cured by fire, it should be taken down, and removed to the pressing house, (which should be kept as a store house,) and crowded away on the tier poles as close as possible, to prevent its getting in "high order," as tobacco loses in weight, and changes color, every time it gets very high. As soon as the pressing house is filled, other houses should be set apart for the same purpose, until the whole crop is stowed away. Tobacco thus crowded away, is in much better condition than when hanging open, or bulked down: for it retains the color and substance which it had when cured, and is not liable to acquire a sour smell, which is very often the consequence of early bulking.

When there comes a season for stripping, the tobacco on the lowest tiers will be in order, which should be taken down and bulked; and then there will be room to open that above, which, when it comes in order, should in like manner be taken, and so on, until the whole crop is gone through.

Tobacco should not be taken down in very high order to strip, as it will be impossible to strip as much, owing to the difficulty in pulling the leaves off of the stalks: and it will be impossible also to get the dirt off of it, which should always be done before it is bulked down; or else it can never be as effectually done afterwards. This is a matter of considerable importance, particularly in the management of a dirty crop.

In stripping, the tobacco should be carefully assorted into at least three classes, to wit: *long*, *short*, and *lugs*. I have usually divided it into four classes, the fourth being simply a separation of the bright from the dark. The first and second qualities should be tied up into neat bundles of about six or eight leaves, all being nearly of the same length. The lugs can be tied into much larger bundles.

As the tobacco is stripped, it should be bulked down, until a sufficiency is procured to commence pressing, when it should be re-hung in uniform and open order, and suffered to remain until it gets thoroughly dry, leaf and stem, and then the first time it comes in order to be handled without much breaking, it should be taken down and neatly bulked, and heavily weighted.

Too much caution cannot be used about the order in which tobacco is taken down for pressing. Experience has taught me that no season is to be relied on between the months of November and April, unless the wind is from the south or south-west. No matter how fine the order may appear to be, if the wind is from the north-east or north-west, let it alone, for it will certainly prove too high when it is opened in market. If any one thing is more essential than another in the management of tobacco, it is *dry order*. I have almost invariably pressed my tobacco so dry as to make it necessary to steam it a little over a fire immediately before handing it into the hogshead, in order that it may be packed without breaking, and I never had a hogshead that was said to be too dry when opened in market.

The casks should be made of well seasoned staves, about three-fourths of an inch in thickness, and should be thirty-eight inches in diameter across the heads, and fifty-four inches in length, made nearly straight. The mode of packing the tobacco in the casks is so well understood, and so universally the same, that it is deemed unnecessary to give a minute description of it. The simplest and most convenient machines for pressing, are those that are worked with a lever. The beam should not be more than twenty-two feet long, and the lever is worked in a permanent sword that passes through the end of it. Three hands can press two hogsheads in four or five days, which should each weigh about sixteen hundred pounds net.

These views on the subject of tobacco culture, are submitted with great diffidence to the intelligent planters of Virginia; and should they fail to suggest any thing new or valuable, may be the means of eliciting information from others, much more capable than myself, to give instruction in this, the most intricate and laborious of all our agricultural pursuits. The effects of tobacco culture on the agricultural interest of Virginia, will form the subject of my next number, and will complete the series promised in the commencement.

Wardsfork.

G.

For the Farmers' Register.

TOBACCO CULTURE—No. 5.

On the effects of the Tobacco crop on the agricultural interests of Virginia.

From the earliest history of this country to the present moment, the tobacco crop has been one of considerable interest, not only to individuals, but to the community at large: and although it has been a great source of wealth to this community, and to the United States in general, in a commercial point of view, it has done more to blight and impoverish Virginia than all the other crops that have been the product of her once generous, but now abused and exhausted soil. The time was, when there was no difference of opinion prevailing about the propriety of making this crop. But now, it has become a question of very serious import, whether the crop should not be entirely abandoned, or at least very much diminished. Indeed, interest and sound policy at home and abroad, unite in demanding a reduction of the crop; and however slow we may be in believing it necessary, or obstinate in continuing its extensive cultivation, it does not require the spirit of prophecy to divine, that the time is not far distant when we must be driven to the dire necessity of quitting the crop, or forsaking the country. When dread alternatives like these stare us in the face, and threaten us with consequences so much to be deplored by every friend to his country, it becomes the duty of every intelligent agriculturist to forego his present gain, and do all in his power to diminish the cultivation of the crop, and to renovate our already much abused and impoverished soil. In the early settlement of Virginia, when the whole face of the country was thickly covered with almost unbroken forest, there was every inducement at home and abroad, to encourage the cultivation of tobacco; but now, the whole scene is changed—sadly changed. Two generations have not passed away since the settlement of this part of Virginia, and what do we now see! Our country mourning, and presenting the appearance of decrepitude and premature old age. Our majestic forests have fallen at the feet of the rapacious planter—our fields are lacerated with the plough of the ruthless cultivator, and our whole country presents a scene melancholy to behold. It therefore becomes us, one and all, to seek out the cause of this decay, and staunch the wounds of our beloved, and bleeding country.

In the early settlement of eastern Virginia, the tobacco crop was extensively cultivated, and continued so to be, until the country was so much cut down and exhausted, that it was no longer a subject of interest to the planter, but of manifest injury to his present and future agricultural prospects. Not until the alternatives of abandoning the crop or the country, stared the people of eastern Virginia in the face, did they determine to forsake the crop, and seek out other subjects of profit in their agricultural pursuits. So paralyzing and blighting are the effects of this crop (where extensively cultivated,) upon the resources of any country, that it requires a long time for its inhabitants to accommodate their feelings, habits, and prejudices to a change so radical, and enter with spirit and energy into a system calculated to restore their exhausted lands, and retrieve their fall-

en fortunes. Hence it is, that we see now for the first time, the people of that favored section of country, awaking from their lethargy, and availing themselves of all the advantages so abundantly furnished by nature, for the melioration of their agricultural condition. These having been the effects of the extensive cultivation of the tobacco crop in eastern Virginia, let us see what are its effects upon the agriculture of middle Virginia—the section in which we live. To the evils already enumerated, all of which are applicable to our region, we shall add many others, to the truth of which, our experience bears ample testimony. From the excessive drudgery of the crop, it has the effect to discourage white labor, and consequently, encourage the substitution of slave labor. This has decidedly a bad effect upon the habits and morals of the white inhabitants of our country, as well as on their agricultural profits; for, whatever has a tendency to encourage idleness, increases extravagance and vice. I verily believe, that were it not for the extensive cultivation of tobacco, parents in this country would bring up their children to work on their farms, and instead of the swarms of “professional” drones and idlers that we daily see hanging upon the skirts of society, and living upon the labor of the industrious portion of the community, we would see an industrious and intelligent population, content to enjoy the profits of their own virtuous labors. It has the effect also, to increase the value and scarcity of the actual necessities of life—to wit, corn and pork, and consequently, those articles of prime necessity have always been comparatively scarce, and high, in this part of the country. Indeed, I know many, very many intelligent and wealthy planters, who make this exhausting, troublesome, and expensive crop to buy corn and pork—thereby restricting the comforts of living, and rendering themselves dependent upon others for the very things that sound policy and good economy would require them to furnish from their own farms. For, so fully does this destructive policy enter into our domestic economy, that there is not a pig upon our plantations, that does not feel its blighting effects. It is a remarkable fact also, that when the largest crops of tobacco are made, the least profit is realized by the planters: for the abundance of the crop keeps down the price, and consequently does not repay the planter for the increased wear and tear of his land, and expense of cultivation. I am clearly of the opinion, that if the tobacco crop of middle Virginia was diminished one-half, the planters would realize more clear profit, live in far greater plenty and comfort, and at the same time, have an opportunity to improve their lands with rapidity, and make many articles with their own labor, that they now have to pay money for—and that money, made in the hardest possible way—to wit, by the tobacco crop. It is obvious to every one who looks abroad upon the face of our country, from the tide water to the mountains, that the tobacco crop has been the great agent in its destruction—and, judging the future by the past, I venture to assert, that in twenty years to come, three-fourths of the tobacco made in the United States, will be raised in the great Valley of the Mississippi. Its tendency has been west-ward ever since its earliest introduction into Virginia; it must therefore, from the nature of the case, ul-

timately centre (and that at no distant day) in that great Valley. And I for one, will hail that era as one of the brightest for the agricultural prospects of middle Virginia. Already, nearly all our best lands have been cut down, in cultivating this ruinous crop, and hence, it becomes manifest, that we cannot be, to any extent, a tobacco making people. Let us then, curtail our crops, improve our lands, husband our resources, and with the smiles of providence, and the approbation of our own consciences, we shall be a prosperous and happy people, enjoying a climate, exempt from the extremes of heat and cold, and the fruits of a soil, susceptible of as a great a variety of products as any on the habitable globe. Then, and then only, will we deserve well of posterity, and improve the talents so bountifully committed to our care.

Wardsfork, Charlotte County.

G.

INQUIRIES AND REMARKS ON THE EFFECT
OF EXPOSING GYPSUM TO THE WEATHER.

Valmont, Jan. 23, 1835.

To the Editor of the Farmers' Register.

I have a parcel of Plaster of Paris which has been several months exposed in hogsheds to all the vicissitudes of weather, wet and dry, hot and cold, even to freezing. It is the leavings of a plaster yard, and this not completely ground, is mostly in a sandy state with some lumps; these lumps will crumble more easily than the lumps as we first receive it. I want to know whether it has totally lost its virtue, or to what extent, by exposure; and whether in preparing it for use, it would be proper to dry it over the fire—for it is quite wet, and seems very unwilling to surrender its moisture. As lime is one of its components, I presume it has been partially slaked, and is therefore more or less weakened. I have subjected it to one test which seems to indicate that it is not entirely destroyed. By heating, and then pouring water upon it, it runs together and forms quite a hard cement. For want of pot or pearl-ash I cannot try it by boiling with that, nor have I the means of determining whether the residuum would be carbonate of lime. When plaster is scattered over the earth it is immediately liable to this slaking process, (if it may be so called) and all the effects of sun, air, and rain; and universal experience I believe attests, that it is slow and *continuing* in its action, not producing its effect by any sudden and powerful impulse. Its action is so slow, that we have a right to suppose it is going on a long time—for months or years—long after the weakening effects of weather upon it have taken place. The result of an experiment at Dover, communicated some years ago to the Agricultural Society of Richmond, proved that the effects of plaster were visible fourteen years, I think, after the plaster was applied: and that I witnessed myself. The slow operation of plaster, results from its *modus operandi*, whether as an *absorbent*, by drawing and retaining moisture around the plant, or as a *solvent*, by preparing vegetable matter for its food. The only difference then, between the application of plaster in its fresh state and in that which I have supposed, is in the point of time whilst (in the first state) the dissolving or *slaking* process occurs. Now, what is the value of that difference?

I will trouble you with another question, whilst

we are upon the subject. If plaster acts merely as an *absorbent*, of what consequence is the nature of the soil, provided it is loose enough to allow the powder to descend to the roots, and not so loose as to allow it to pass below them? If as a *stimulant* in any other way, why should not a moist soil be as sensible of its effects as a dry one, provided it is not so wet as to carry off the powder? Would you advise lime or plaster in a wet piece of ground—it being presupposed that all practicable means have been used to drain it?—for I believe it may be considered an axiom in agriculture, that for whatever purpose land is intended, it must be laid as dry as possible.

If Mr. Editor, interrogatories generally betray ignorance, much more do they in this particular case—and taking to myself the *compliment* once paid to Pope, I might with propriety subscribe myself a? But not having pride enough to hide my ignorance, I give you my proper appellation, which you will recognize to be that of an old fellow-collegian.

C. H. HARRISON.

[The foregoing inquiries proceed from one who has had far more practical experience of the use and effects of gypsum than we have gained—and if that mode of observation and of proof alone were to be the proper test, we ought to take refuge in our want of experience, and remain silent. But as most of the answers sought, must depend altogether upon the established chemical properties of the substances in question, we can scarcely err in deciding according to those properties: and the remarks which follow will be confined within such limits as will prevent our losing sight of this sure guide—without which, none will fail to wander into uncertainty and error.

The slaking of quicklime, alone, is no cause of injury, or weakening of its power—but as this process always precedes or accompanies the injury which is really caused by exposure to air, the slaking of lime is generally considered as evidence of some progress at least having been made in the lime's becoming carbonated, *effete*, or mild, or losing its peculiar qualities as *caustic* lime. The newly burnt material for lime, (as shells or limestone,) greedily attracts moisture, and by uniting chemically with water alone, it slakes, but still retains all its caustic power, which depends not on the absence of water, but upon the deprivation of carbonic acid, which the lime had lost by burning. This acid next commences re-combining with the lime, to which it is strongly attracted, and is furnished by the atmosphere, and as well as by the earth, and by plants and other matters in a state of decomposition—and this process of re-combination is greatly hastened by the lime having been slaked, and thereby exposing a far greater attracting surface. Of course, the more it is spread to the air, or to whatever will furnish carbonic acid, the more rapidly the lime loses its caustic quality, until none remains. The lime now, as carbonated or mild, may be in most cases, as valuable a manure as when quick, (as we have elsewhere endeavored to show)—but as a material for cement, and for every purpose for which its caustic state was essential, the lime is weakened and indeed destroyed, by being changed to a different chemical substance.

The general understanding of this result of the exposure of lime, extends improperly to other substances of which lime forms the base, as gypsum, which is generally considered both by dealers in the article, and by many farmers, to be altered and injured by long exposure to air, if ground, and by rain, even in the unbroken stone. To determine whether there can be any such effect we must attend to the chemical combination of gypsum, and its state before and after such kinds of exposure.

Gypsum in its natural state is composed of lime, sulphuric acid, and water, the latter being as much a part of the chemical combination as either of the other ingredients. The mutual attraction of the lime and sulphuric acid is so strong, that no separation can be produced by any thing that air or rain can present. Neither can gypsum be wasted, any more than it can be decomposed, by air alone, or by remaining dry in powder. Water dissolves a very small proportion of gypsum—about one-six hundredth part—and therefore it will be slowly wasted by solution, if exposed to wet, and the fluid be allowed to pass off. The mere wetting, without the fluid sinking or flowing from the mass, however tending to make the gypsum troublesome in using, cannot change its nature, nor affect its value as manure. From these premises it may be inferred that the gypsum saved by our correspondent, is not altered in its chemical character—nor injured, except by being rendered more inconvenient to use—and also in this respect, that the portion previously wasted by the rains, was the part most finely pulverized, softest, and therefore the most fit for immediate action as manure.

Exposing gypsum to moderate heat has no effect except to drive off the water chemically combined, as well as any accidental supply of uncombined moisture. It would seem that merely the removal of its water could scarcely affect the action of the substance as manure. We incline to this opinion—but would not confidently assert that no injury can take place in this manner. There is in this case a partial decomposition of the substance—and slight as it is, it may materially affect that fertilizing power which is in every aspect so mysterious and inexplicable. It is highly important that it should be proved by sufficient experiments whether a moderate degree of heat is injurious to the value of gypsum—for if it is not, by using heat to drive off the water chemically combined, the stone is made much more soft, and easier to pulverize for use.

These explanations may be considered by many, and even by our friend who has suggested them by his inquiries, as too simple and trite to deserve being thus formally presented; and if so, our apology is, that many who are most conversant practically with the subject, show by their course that even these feeble lights might aid their deductions.

There is no known reason, derived from the theory of its operation, why lime (whether caustic or mild) should not act profitably on land not sufficiently drained, except in this respect, that improvements of every kind must avail but little on soils suffering from redundant moisture. As to gypsum on such soils, we know

nothing, except the generally received opinion that on all wet land the application is unprofitable.]

From the Horticultural Register.

ON THE CULTIVATION OF CELERY.

It appears to me that a few practical hints on the cultivation of this useful and delicious vegetable might prove interesting and serviceable to many of your readers. I beg to premise that it is a mere detail of the methods I have practised this summer, by which I have raised celery in heads of two and two and a half feet high, of which twelve to eighteen inches are blanched and tender; they are single heads, without offsets, and many four and five inches in circumference. This method has one convenience, which is, that the young plants are raised in the open ground, without glass or hot-bed.

In the beginning of May, later or earlier, as the season may indicate, dig and pulverise well about six square feet of well manured and open ground—water it very lightly, but thoroughly, with a nose on the watering-pot, early in the day, then sow your seed and water again thoroughly in the same way. Cover up this bed lightly with a double layer of Russia mat, which should be dry, and kept down at the corners with stones; the sun, striking on the mats, penetrates them, and causes a gentle moist heat to rise from the earth; this is the most favorable state of an atmosphere for the vegetation of seeds, and the celery, particularly if not fresh, is very difficult on this point; the covers should be maintained in as dry a state as possible, (after heavy rains, the upper mat might be changed,) because, if wet, considerable evaporation takes place in the night, which is always productive of cold, and would be apt to rot the tender shoot just piercing the seed; on the other hand, if dry, it prevents the escape of heat when the sun's rays have left the earth, and retains underneath sufficient warmth to prevent any check in the vegetation; in a fortnight or three weeks, according to the season, little yellow and white sprouts will appear; when these are one-quarter of an inch high, the upper cover should be removed, that there may not be too much weight on the young plants, and if the weather continues mild, in a few days afterwards, remove the other. If well watered in the beginning, it will scarcely need any further moisture during the first process; but those who practise this method will hardly be restrained from peeping under the mats once or twice during the fortnight, when, if sultry weather has prevailed, their own judgement will guide them on this head.

The second part of the method is to have another piece of ground, double the size of the former, prepared in the same way, and when the young plants are in their fourth leaf, or about two inches high, take them up and transplant them carefully into this fresh bed, about one inch asunder, first trimming the roots a little.

If well watered and weeded, by the first of July they will have attained sufficient growth to be removed into trenches, which should be prepared in an open, well exposed spot, by digging them two spades deep and two and a half feet wide, leaving three or four feet distance between the trenches; on this space is to be piled up, like a bank, the

earth taken from the trenches. Put about four inches of good manure at the bottom of each trench, and dig it in; take up the plants, and previous to putting them into the earth, trim the roots very carefully, being sure to cut off the end of the tap root, and eradicate all little shoots and radicles; where the heart joins on to the root, as these shoot up and produce that mass of small heads, seen in our markets, instead of one large, solid, handsome plant; place them about three inches distance and water well for the first week. As the plant grows, gently fill in the trench with the earth on each side, taking care not to throw in large lumps, which twist and contort the celery, and spoil its beauty; and continue earthing up until there is a bank above ground as high as the trench was deep.

I prefer digging the trenches east and west, because the bank on each side shades the young plants in July and August, from the rays of the hot sun, and in September and October, when it is desirable the celery should advance as much as possible, the southern bank, earthed up, imbibes the heat and retains it.

I believe, by covering up the trenches well with pine and savin boughs, it may be dug fresh all the winter; but I have placed mine in an upright position in the cellar, half covered with earth and kept moist—they appear to suffer but little.

I have been rather explicit, and given my reasons for each operation at the risk of being thought too prolix; but, whenever I set earnestly to cultivate a plant, I have generally found directions in books rather too vague, and here and there a link wanting in the chain, which gave me trouble to annex; those, therefore, who are well acquainted with this process, must excuse this in favor of those who are not so efficient.

I. E. T.

For the Farmers' Register.

ACCOUNT OF THE WILD RICE OF THE NORTHERN LAKES.

Essex County, Dec. 13, 1834.

Recently in reading "Flint's History and Geography of the Mississippi Valley," my attention was arrested by the account given of wild rice, and not knowing that any attempts have been made to raise it on the Atlantic coast, I here give you the account, hoping if no experiments have been made, it may be the means of inducing some to be tried.

"Wild rice, *zizania aquatica*, or *fatua avena*—by the French, *folles avoines*—by the Indians, *menomene*. It is found in the greatest abundance on the marshy margins of the northern lakes, and in the plashy waters on the upper courses of the Mississippi. It grows in those regions on a vast extent of country. It is there that the millions of migrating water fowls fatten, before they take their autumnal migration to the south. It is there, too, that the northern savages, and the Canadian traders and hunters, find their annual supplies of grain. But for this recourse, they could hardly exist. It is a tall, tubular reedy water plant, not unlike the bastard cane of the southern countries. It very accurately resembles the cane grass of the swamps and savannas on the gulf of Mexico. It springs up from waters of six or seven feet in depth, where the bottom is soft and muddy. It rises nearly as high above the water. Its leaves

and spikes, though much larger, resemble those of oats, from which the French give it its name. Its culm is jointed, as large as the little finger; leaves broad, and linear; panicle more than a foot in length; the lower branches with spreading barren flowers, the upper, with fertile and erect ones. The seeds are blackish, smooth, narrow, cylindrical about three quarters of an inch long, deciduous. It is said to have been discovered in the brooks of Massachusetts. When it is intended to be preserved for grain, the spikes are bound together to preserve them from the ravages of birds and water fowls that prey upon them in immense numbers. It thus has a chance to ripen. At the season for gathering it, canoes are rowed among the grain. A blanket is spread upon them and the grain is beaten upon the blanket. It is perhaps, of all the cerealia, except maize, the most prolific. It is astonishing amidst all our eager and multiplied agricultural researches, that so little attention has been bestowed upon this interesting and valuable grain. It has scarcely been known, except by Canadian hunters and savages, that such a grain, the resource of a vast extent of country, existed. It surely ought to be ascertained if the drowned lands of the Atlantic country, and the immense marshes and stagnant lakes of the south, will grow it. It is a mistake that it is found only in the northern regions of this Valley. It grows in perfection on the lakes about Natchitoches, south of 32 degrees; and might probably be cultivated in all the climates of the Valley. Though a hardy plant, it is subject to some of the accidents that cause failure of the other grains. The grain has a long slender hull much resembling that of oats, except that it is longer and darker. In detaching this hull the Indians use a process of drying, that, probably, in most instances destroys its germinating principle. Those who have found this grain unpleasant, have perhaps, eaten it when smoked, and badly prepared. There is probably, the same difference in quality too, as in other grains. The grain that we have eaten, was as white as the common rice. Puddings made of it tasted to us like those made of sago."

I imagine it could be easily seeded on land covered by water. A few stakes could be set up to form a line; then one hand in a small boat could paddle, whilst another could seed; in this way it could be done quickly, and with as much regularity as seeding wheat or oats on high land. Should they be found not readily to sink, they could be first rolled in dry tenacious clay. The spring would probably be the best time to seed, and the more muddy the water at the time the better, as a deposite would be left which would, in a great measure, prevent the seed from being destroyed by fish.

EDMUND F. NOEL.

For the Farmers' Register.

A PRODUCTIVE KIND OF CORN, AND THE MANNER OF ITS SELECTION.

Many years ago Mr. Cooper, a gentleman well known in Jersey as an experienced practical farmer, by a publication recommended that seed corn should be gathered from strong vigorous stalks which bore two ears. I was not then engaged in agriculture, but I well recollect the publication attracted some attention, though I am in-

clined to think the experiment was not made in this part of the country. A gentleman of Talbot, some years past, whether from the recollection of Mr. Cooper's suggestion, or from his own speculations, I know not, gathered his seed corn in this way, and became convinced of the advantage. His neighbors who saw the increased product, obtained seed from him, and adopted his practice, which in time generally prevailed in Talbot, and has extended to this, and other counties of the Eastern Shore. I recollect a conversation with the late Col. Edward Lloyd on this subject: he was a man of sound judgement, and one of the best practical farmers on this shore. At that period he had not planted this corn, and having experienced in the course of his life both loss and disappointment from the representation of confident theorists and sanguine experimentalists, whose "geese grow into swans," he was in matters of this kind slow of faith; but he became convinced of its value by observation, and tested it by cultivation.

Four years ago I obtained some of this corn, which I have continued to plant since, always carefully gathering the seed according to the suggestion of Mr. Cooper, and my crops have been much increased. My experience induces me to think, that no great advantage is derived if this corn is planted in lands naturally poor, or exhausted by cultivation; but where in a state of fertility either naturally or by improvements, I think the product from this kind of corn will be more than fifteen per cent.

WILLIAM CARMICHAEL.

Wye, Eastern Shore, }
Md. Jan. 22, 1835. }

For the Farmers' Register.

A PROJECT FOR COVERING HOGSHEADS OF TOBACCO ON BOARD BATEAUX.

Having been for several years past somewhat familiar with the responsibilities incurred by the carriers of tobacco on the Roanoke, Appomattox and James Rivers, and the damage sustained by the dealers in the upland inspections on those streams, for the want of a secure and sufficient covering for the hogsheads, my attention has been directed with much interest to the subject of some remedy for the evil. The materials now in use for covering are various, consisting of different kinds of woollen or cotton fabric, but none of them sufficiently impervious to water, to prevent serious damage in a very violent or long continued rain. This is manifest from the exhibition which a list of tobacco from an upland inspection makes in the fall "sampling" in the city of Richmond. And where the tobacco passes through the hands of two sets of carriers, as is the case on the Roanoke and Appomattox, the loss arising from damage falls on the dealers, from an impossibility of knowing upon whom to fix it. It is therefore important that dealers should interest themselves on the subject, and endeavor to devise a plan by which their property is secured from unnecessary exposure to damage.

My plan is this: provide yourself with a stock of plank made of hickory, from a foot to thirteen inches in width, and three-fourths of an inch thick. (Other descriptions of plank might answer the purpose well, but I prescribe hickory plank, because it is essential that the material used should not be liable to split or warp from the influence of

the sun and wind; and I understand from an intelligent carpenter, that the plank made of this tree is free from these defects.) Have the planks well seasoned, and let each piece be cut a few inches longer than an ordinary lawful hogshead. Six pieces of the prescribed width will be enough for one cover, making beside the joint at the top, but two joints of a side. Two straps of leather two inches wide and a foot and a half or two feet long, the kind that is generally used for wagon harness preferred, because it combines pliancy with strength. The plank must be nailed to the leather straps in the following manner: the two planks which are to cover the top of the hogshead must project one over the other like the comb of a house, and be nailed at each end to the leather straps, through the middle of the plank. (that is, midway its width,) which will make it lie better around the hogshead. The straps which attach the two top planks must be nailed on the under side. The lower edge of each top plank must be bevelled underneath about an inch, and the upper edge of each second plank must be likewise bevelled to secure a good lap of two inches. Then there must be four leather straps of the width prescribed above, and three feet long, one end of each, nailed to the two top planks respectively, a little below the nail by which the two understraps were fastened, and on the upper side of the cover. When the two second planks are fitted, as described above, they should be nailed through the middle to the strap where it passes over them, which should be about six or eight inches from each end: and so likewise the third, on each side. This will bring the covering so low that the water will drop harmless to the bottom of the boat. Usually, daubing with some tenacious clay is considered a sufficient protection for the head of the hogshead; but if more is preferred, two yards of cotton oznaburghs suspended from small nails in the top plank of each cover, will be a complete protection. After the plank and straps are prepared, the nailing together had better be done over a hogshead, whereby a better fitting of the cover to the hogshead will be secured. It appears to me that this cannot fail to answer the purpose. It is secure, substantial, convenient, and cheap. If the joints are properly fitted, and the planks properly nailed to the leather straps, it is perfectly impenetrable to rain. With tolerable care, they will last longer than the cover now in use. On the return trip they are as useful in covering any description of goods, and when not in use can be folded up in a very small compass, the leather straps to which the planks are attached, serving as hinges. Its cost cannot exceed one-half of those made of negro cotton or plains. Two hundred feet of plank, one dollar's worth of harness leather, and twenty yards of cotton oznaburghs being sufficient to make an outfit for a boat; and the cost of these articles, including the carpenter's bill, cannot exceed \$10. If upon experiment, the above scheme is seen to answer a valuable purpose, I shall feel that I have rendered the commercial and planting community, an important service. If it only serves to attract to the subject more ingenious and contriving reflection than my own, I shall feel thus much good has been done. This much I well know, that the present state of things upon this subject, calls loudly for remedy.

AN UPLAND DEALER.

From the Horticultural Register.

FLORICULTURE FOR THE PARLOR-WINDOW.

The following remarks are from a sheet recently published by G. C. Barrett, and are directions for the management of bulbs and plants in the parlor; and as a little science in parlor-window Floriculture might be beneficial to practice, we here insert them.

"*Hyacinths* and other bulbs that are intended to flower in glasses, should be placed therein during October and November, and kept in a cool room. After the fibres begin to push a few shoots, the glasses may be taken to the warmest apartments to cause them to flower early. Bring a few from the coldest to the warmest every two weeks, and thus a succession of bloom may be kept up from January to March.

"Supply the bulbs with fresh water once a week, in which period they will inhale all the nutritive gas that they derive from that element, if they are in a growing state. Fill the glasses with water, so that the bottom of the bulb may just touch it.

"The water should be changed as it becomes impure; draw the roots entirely out of the glasses; rinse off the fibres in clean water, and wash the inside of the glasses well. Care should be taken that the water does not freeze, as it would not only burst the glass, but cause the fibres to decay.

"December, January and February, is the trying season for all plants that are kept in rooms, especially those that are desired to have a flourishing aspect through the winter, a few general instructions will perhaps be desirable to all those who are engaged in this interesting occupation, which forms a luxury through the retired hours of a winter season, and with very little attention, many are the beauties of vegetative nature that will be developed to the gratification of every reflecting mind.

"All the varieties of *Polyanthus Narcissus* are well adapted for indoor flowering. The Grande Monarque and Roman are charming flowers; the latter is perhaps the earliest of all bulbs; if potted in October or November, it will bloom by Christmas; the flowers are four or five in number, of a delicate satin white, with double cups of a rich jessamine perfume.

"Plants that are kept in rooms generally are such as require a medium temperature, say forty degrees. Sitting rooms or parlors, about this season, are, for the most part, heated from fifty-five to sixty-five, and very seldom has the air any admittance into these apartments, thus keeping the temperature from fifteen to twenty-five degrees higher than the nature of the plants requires, and excluding that fresh air which is requisite to support a forced vegetative principle. Therefore, as far as practicable let the plants be kept in a room adjoining to one where there is fire heat, and the intervening door can be opened when desirable. They will admit sometimes of being as low as thirty-three.

"If they be constantly kept where there is fire, let the window be opened some inches, two or three times a day, for a few minutes, thereby making the air of the apartment more congenial, both for animal and vegetable nature.

"There are very few plants killed for want of water, during winter. All that is necessary is merely to keep the soil in a moist state, that is, do

not let it get so dry that you can divide the particles of earth, nor so wet that they could be beat to clay. The frequency of watering can be best regulated by the person doing it, as it depends entirely upon the size of the pot or jar in proportion to the plant, whether it is too little or too large, and the situation it stands in, whether moist or arid. Never allow any quantity of water to stand in flats or saucers except bulbs. This is too frequently practised with plants in general. Such as *Calla Æthiopica*, or African Lily, will do well, as water is its element, (like *Sagittaria* in this country;) and the *Hydrangea hortensis*, when in a growing state, will do admirably under such treatment. Many plants may do well for some time, but it being so contrary to their nature, causes premature decay; a fetid stagnation takes place at the root, the foliage becomes yellow, and the plant stunted; and in the winter season, death will ensue. Clean the foliage with sponge and water frequently, to remove all dust, &c. Turn the plants frequently, to prevent them growing to one side.

"*Camellias*, when in bud and flower, should never be allowed to become the least dry, neither confined from fresh air. The effects would be, that the buds would become stunted, dry, and drop off. Therefore to have these in perfection, attend strictly to watering. Give frequent airings, and wash the leaves once in two weeks with water. Never keep them above one day in a room, where there is a strong coal fire, and not above two days where wood is used as fuel. Most *Camellias* will bear three degrees of frost without the smallest injury, so that they are easier kept than *Geraniums*, except when they are in bloom. In that state, frost will destroy the flowers. The air of a close cellar is destruction to the buds."

From the Genesee Farmer.

BOARD FENCE SUPPORTED ABOVE GROUND.

I wish to call the attention of the public to a kind of fence mentioned by a worthy writer for the Farmer some weeks ago under the head of setting posts both sides of a fence. The posts were of plank, eighteen inches wide at the foot, and only wide enough for a cap board at the top, leaving a base of three feet to rest on the soil. This was to me an important subject, and I soon resolved on an experiment. I procured a hemlock log five feet long and twenty-six inches in diameter—it was sawed into four inch plank for end posts and two inch for middle ones—they were split so as to leave the posts sixteen inches wide at one end and six at the other—they ought to have been nineteen at one end and three at the other; but my sawyer said the log was so short that he could not cant it sufficient on his carriage. This is a difficulty however, that I think may easily be overcome. I built one length twelve feet long, with two posts, and two lengths sixteen feet long with four posts, two each side. I put five one-inch boards on each length, the bottom one was twelve inches wide, the others six inches; the cap board should be one and a quarter inches in thickness. I am well satisfied with the experiment, and though the base is not so wide as it might have been, yet it stands well, and I think it impossible for the wind to injure it. If it wants any thing, it is weight, and that can be sup-

plied without difficulty. Peeled slabs may be used instead of boards, for the posts are so narrow that the slabs can be cut to the proper thickness with an adze very easily. I have not written to exhaust the subject, but am in hopes that others will be induced to give their thoughts upon it, for I fully believe that our forests afford all that need be required for fence posts. I object to the common mode of setting posts in the ground, for the sole reason that the greatest support is required where they are the most liable to decay, and this I conceive to be unavoidable. I would invite my brother farmers to make experiments for themselves, and publish the results, for reform is loudly called for.

W. P. R.

Holland Patent, Dec. 2d, 1834.

LEGAL GRAZING, OR THE RIGHT OF COMMON.

To the Editor of the Farmers' Register.

I duly received the petition to the legislature for the water fence law confining itself to the James River and its tributary branches; but as this does not in any material way concern us, a number of signatures need not be expected. I only regret that it was not one of a different character—one, to alter the general law of enclosures. I feel safe in saying, that a memorial of this kind would receive almost universal sanction in this county—though the time has been, when it would have been scowled from among us as a lawless usurpation of the rights of the poor. But these dark days are past, and we hope, buried forever in the vortex of time, and a brighter and more auspicious morn is dawning upon us. We have been taught wisdom in the hard and chastening school of experience. We have clung eagerly to the old fabric, knowing no man as a landholder only so far as he had it enclosed with a lawful fence, until we are bankrupts in stock raising, (and I like to have said, every thing else connected with farming.) We can never arrive to eminence, or even respectability, as a stock raising country, as long as this legal scourge of grazing in common, exists. Though nature in her smiling moments have lavished upon us her choicest gifts—our lands carpeted with the richest green, and fed with the fattest soil, and meliorated with the most happy climate, all inviting the varied kinds of stock from more rigorous and snowy climes, but we are deterred by the melancholy experience of the past, from attempting to aspire to reputation in this all-important branch of judicious husbandry. All the helps or advantages that the legislature of Virginia can bestow on the agricultural community for many years to come, would not compensate them for the losses and injury that have been sustained from this law: an unphilanthropic law, one, that is a friend to none—an enemy to the poor—a tyrant to the rich—a scourge to the industrious—a flatterer of the careless and indigent. I am glad to see the determined stand that many counties have taken to rid themselves of this hardship. As the campaign is commenced, and the banner unfurled, it only requires that we should rally to the standard; and if our representatives now sitting, still persist in turning a deaf ear to the loud calls that are now made upon them, we

will feed them out of the same spoon at our next election.

A RADICAL.

Norfolk County, Va., }
Dec. 20th, 1834. }

From the London Quarterly Review of Nov. 1st, 1834.

ALIMENTARY SUBSTANCES—BREAD MADE OF WOOD.

Dr. Prout has of late clearly proved that all the chief alimentary matters employed by man may be reduced to three classes, viz., saccharine, oily, and albuminous substances, the most perfect specimens of which are respectively sugar, butter, and white of egg. The saccharine principle, in its extended sense, includes all those substances which are chiefly derived from the vegetable kingdom—means, in fact, the same thing as what we commonly call vegetable diet. It comprehends all those substances, whatever their sensible properties may be, into the composition of which the hydrogen and oxygen enter in the proportion in which they form water;—for example—what perhaps may not a little surprise the reader—the fibre of wood, which chemists call *lignin*. Much skillful manipulation and delicacy of experiment were required to establish this result; but the nutritive property of the woody fibre—in short, that a tolerably good quartern loaf can be made out of a deal board—has been proved by the recent labors of a German Professor, and may be verified by any one who will take the trouble to repeat them:—

“The following (says Dr. Prout) was the method he employed for this purpose. In the first place, everything that was soluble in water was removed by frequent maceration and boiling; the wood was then reduced to a minute state of division, that is to say, not merely into fine fibres, but actual powder; and after being repeatedly subjected to the heat of an oven, was ground in the usual manner of corn. Wood thus prepared, according to the author, acquires the smell and taste of corn-flour. It is, however, never quite white, but always of a yellowish color. It also agrees with corn-flour in this respect, that it does not ferment without the addition of leaven, and in this case sour leaven of corn-flour is found to answer best. With this it makes a perfectly uniform and spongy bread; and when it is thoroughly baked, and has much crust, it has a much better taste of bread than what in times of scarcity is prepared from the bran and husks of corn. Wood-flour, also, boiled in water, forms a thick, tough, trembling jelly, like that of wheat-starch, and which is very nutritious.”—*Philosophical Transactions*, 1827, Part II. p. 318.

To make wood-flour in perfection, according to Professor Autenrieth, the wood, after being thoroughly stripped of its bark, is to be sawed transversely into disks of about an inch in diameter. The saw-dust is to be preserved, and the disks are to be beaten to fibres in a pounding-mill. The fibres and saw-dust, mixed together, are next to be deprived of everything harsh and bitter which is soluble in water, by boiling them, where fuel is abundant, or by subjecting them for a longer time to the action of cold water, which is easily done by enclosing them in a strong sack, which they only half fill, and beating the sack with a stick, or

treading it with the feet in a rivulet. The whole is then to be completely dried, either in the sun or by fire, and repeatedly ground in a flour-mill. The ground wood is next baked into small flat cakes, with water rendered slightly mucilaginous by the addition of some decoction of linseed, mallow stalks and leaves, lime-tree bark, or any other such substance. Professor Autenrieth prefers marsh-mallow roots, of which one ounce renders eighteen quarts of water sufficiently mucilaginous, and these serve to form four pounds and a half of wood-flour into cakes. These cakes are baked until they are brown on the surface. After this they are broken to pieces, and again ground, until the flour pass through a fine bolting-cloth; and upon the fineness of the flour does its fitness to make bread depend. The flour of a *hard wood*, such as beech, requires the process of baking and grinding to be repeated. Wood-flour does not ferment so readily as wheat-flour, but the Professor found fifteen pounds of birch-wood flour, with three pounds of sour wheat-leaven, and two pounds of wheat-flour, mixed up with eight measures of new milk, yielded thirty-six pounds of *very good bread*. The learned Professor tried the nutritious properties of wood-flour, in the first instance, upon a young dog; afterwards he fed two pigs upon it; and then, taking courage from the success of the experiment, he attacked it himself. His family party, he says, ate it in the form of gruels or soup, dumplings and pancakes, all made with as little of any other ingredient as possible; and found them palatable and quite wholesome. Are we, then, instead of looking upon a human being stretched upon a bare plank as the picture of extreme want and wretchedness, to regard him as reposing in the lap of abundance, and consider, henceforth, the common phrase 'bed and board' as compounded of synonymous terms?

The Laplanders of Trysild, and the mountainous part of Oesterliden, are said by Von Buch, in his *Travels through Norway and Lapland*, in 1806—7—8, to make a bread, called by them Barke Bröd, in the following manner:—

"When the young and vigorous fir trees are felled, to the great injury of the woods, the tree is stripped of its bark for its whole length; the outer part is carefully peeled from the bark; the deeper interior covering is then shaved off, and nothing remains but the innermost rind, which is extremely soft and white. It is then hung up several days in the air to dry, and afterwards baked in an oven; it is next beat on wooden blocks, and then pounded as finely as possible in wooden vessels. But all this is not enough: the mass is yet to be carried to the mill and ground into coarse meal like barley or oats. This meal is mixed up with thrashed oat-ears, or with a few moss-seeds; and a bread of about an inch thickness is formed of this composition."—p. 87.

In another place, the same traveller, talking of the Enare Laplanders, says,—

"In summer they scarcely eat anything but fish from the fresh water lakes, and drink with great eagerness the water in which the fish has been boiled. In winter they must put up with dried fish, and with soups of water, fir bark, and rein-deer tallow. They peel off, in summer, the innermost bark of the fir, divide it in long strips, and hang them in their dwellings to dry for winter stores. When used, these strips of bark are minced in

small pieces along with the rein-deer tallow, and boiled together for several hours with water, till they form a thick broth."—p. 324.

It is not improbable, says Dr. Prout, when speaking of this method, that during the above processes the lignin combines with water, and forms an artificial starch; what the change may be we will not venture to decide. As for the spongy bread made by the Tubingen Professor, we should like very much to taste it; but with respect to the poor Laplander's coarse and husky variety of *the staff of life*, it can be, we greatly fear, little better than the newly-invented patent bread of our own metropolis.

One word on this new-fangled article. It is well known that in the old established way of baking, the steam which arises during the process is allowed to escape as of no value; but accident discovered, a few years ago, that this vapor, if condensed, exhibited traces of alcohol, and the collection of it immediately became an object of cupidity and speculation; and this, together with some saving of fuel during the process of baking, suggested the patent and the formation of the company upon a great scale. One of its recommendations was, that bread so made, though kept for any length of time, does not become sour; and this we understand is the fact; but how and at what expense is this incorruptibility procured? Sour bread is unquestionably bad; but is not bread which, if kept too long, is liable to become sour, the very article we want? In the new method, the distillation (for such it is in reality) is pushed as far as it can go: the whole product of the fermentation is obtained and collected, so that the residue, or loaf, may be regarded as a *caput mortuum*, incapable of undergoing further change; but is it not rather unluckily deprived, at the same time, of its saccharine principle—in short, of all nutritive property? For our own parts, we adhere to the old orthodox 'bread with the gin in it.'

THE WAY TO BUILD STONE FENCES—SOWING ASHES WITH GYPSUM.

Madison County, (Va.) Jan. 21st, 1835.

To the Editor of the Farmers' Register.

I noticed in your January No. of the Farmers' Register, information asked for, by "A Querist," respecting the best mode of making stone fencing. Having had some experience in this operation, I will endeavor to describe my mode. The material which I use is round river stone—of all, the most difficult to make stand. The stone wall or fence, when built (on a level surface) is 4½ feet high, 4 feet wide at the base and the sides drawn in regularly as they rise. The proper form is preserved easily and correctly, by making use of the frame which will be now described. Two planks, each 7 feet 10 inches in length, 9 or 10 inches wide, and 1½ inches thick, are coupled together like the rafters of a house, or so as to be something like the letter A, but presenting other proportions. The two planks, (represented by the sides of the A,) are united at the top by the sides of the ends—and the other ends, or feet, are spread open so as to be 4 feet apart, and are secured at that distance by a horizontal cross piece, or collar beam, as it may be called, which is made of scantling, and is to be at 4½ feet, perpendicular dis-

tance, above a line drawn from one to the other of the spread ends of the planks. The space below the collar beam, is the size of a section of the wall, and is used as a measure to preserve that size. Another pair of similar planks are put together in precisely the same manner—and then these two corresponding parts, or ends, are united by a piece of scantling 15 feet long, which runs from the middle of one collar beam to the middle of the other. When thus united, the two rafter shaped ends of the frame should stand upright on their feet, and be parallel to each other. Two side planks 12 inches wide, and as long as the whole frame, are then laid outside of, and lying against the spread legs of the frame. These planks are to direct the placing of the stones for the sides of the wall. They are kept close to the legs of the frame, by other pieces of plank which are attached outside of, and parallel to each of the legs, and separated from them $1\frac{1}{2}$ inches by small blocks. The long side planks may be raised or lowered, and yet are kept in place by these outer pieces—and by holes and pins, are fastened at any desired height.

The frame is used by being placed over the line of the intended fence, the side planks being then at bottom, and equally distant from the central line of the foundation of the wall. I first haul my rock in place in a line parallel with the foundation of my fence. The frame is then moved in place where the fence is to commence, the two side planks resting upon the ground. Two laborers, one on each side, place the rock, carefully touching the side planks from one end to the other, whilst others are employed throwing in rock in the intermediate space, without being particular in placing them, from which the two hands before mentioned select such rock as is most suitable for the case of the wall: for if this is put up judiciously, it matters not how the inner stones are placed. When the rock is upon a level with your side planks, take out the pins which fasten the side planks, and slip them one hole higher; then proceed to place the rock as before, continuing to move your side planks as the rock is level with the upper edge, until your wall touches the scantling. Then, with a man at each foot of the frame lift it up a foot or two, and move it forward. In this way I have had from thirty to thirty-five yards of fencing made in a day by ten or twelve hands. I would here mention that the hands employed in filling up, or throwing in rock, do it with hand barrows—which enables them to do it much more expeditiously than by hand. I build my fence upon the surface of the ground, without digging a ditch, in consequence of having a stony foundation on the margin of the river. I think there would be no necessity for digging a ditch where the fence is on level ground, though not stony: but I think it would be necessary where the ground slopes, as the action of the frost would be apt to undermine the lower side of the wall. I should judge that four inches would be sufficiently deep for the foundation. It has been several years since I commenced stone fencing, not a foot of which has fallen. At the end of the wall or fence where I have a gate, I procure, if practicable, square stone to put in; as the round stone if put up perpendicular is apt to give way.

In answer to the second query, I have to say that I have been in the habit of mixing ashes with my plaster, in equal parts, and sowing after being

mixed, the same quantity by measure as I usually sowed of plaster alone. I have found equal benefit from the ashes and plaster as from the plaster alone, which is a saving of fifty per cent. in plaster. I prefer the ashes damp: this will enable you to sow with more regularity, and in moderately windy weather.

C.

ON THE EFFECTS OF GATHERING FODDER ON CORN—REAPING WHEAT GREEN.

To the Editor of the Farmers' Register.

Prince Edward, 24th January, 1835.

The subject of stripping Indian corn blades and topping the corn, as practised generally in this part of Virginia, having been noticed several times in the Farmers' Register, it has occurred to me, that it may not be improper to add my experience on the subject. I have for many years been satisfied that it is very unprofitable management. Though I practise it, with a view of supplying a sufficient quantity of fodder for my stock, I am constrained to acknowledge, that it is nothing but sheer negligence in providing other means of supplying fodder or hay, that induces me to do so from year to year. I will give you as nearly as my memory serves, the result of an experiment made by me when a lad, under the special direction of my father, who made a record of this experiment, as well as of a great many others, which would now probably be very useful, but which were all lost or destroyed by his servants, during the latter declining years of his life. I cannot pretend to remember accurately the quantities of corn and fodder produced in the experiment which was made more than thirty years ago, and is nearly as follows:

Thirty-nine rows of corn, 60 hills long, $5\frac{1}{2}$ feet each way, and two stalks in each hill, were planted on tolerably good land, and cultivated as common, till it was thought the proper time for pulling fodder. I then carefully pulled the fodder off of each first and second row alternately through the piece, leaving each third row to stand with all the fodder and tops on, till perfectly dry. When it was thought the proper time, I cut the tops off of each first row, so that there were 13 rows of corn with fodder pulled and tops cut, 13 rows with fodder pulled off to one blade above the ear and tops left till dry, and 13 rows from which neither fodder nor tops were taken at all. Each parcel of fodder was cured and kept apart from the other, and the blades were stripped from the tops of each first row, at the time of cutting the tops; and when cured, put with the fodder that had been pulled from the same rows. Each parcel of corn was gathered, and when perfectly dry, shelled and weighed separately, and the fodder from the 13 first rows, and that from the 13 second rows, each weighed separately. The quantity of corn raised from the 13 first rows, from which the fodder was pulled and the tops cut, was considerably less than that raised on the 13 second rows, from which the fodder was pulled and the tops left standing till dry, and still much less than the corn raised on the 13 third rows, on which both fodder and tops were left till perfectly dry. The quantity of corn raised on the 13 third rows, weighed a few ounces more than the corn and fodder both together,

which was raised on the 13 second rows, from which the fodder only was pulled, and tops left standing—and weighed a few ounces less than the corn and fodder, with the addition of the fodder stripped from the tops, raised on the 13 first rows, from which the fodder was pulled and tops cut. I remember the conclusions to which my father and myself came were, that the whole produce in each case, was so nearly of equal value, as to make scarcely an object worth consideration, even in a large crop, and that the whole labor of gathering and curing the fodder and tops (a considerable item in a farmer's account by the by) was entirely lost.

Another experiment which I made about the same time, (of which I have not as perfect recollection) was to strip the fodder from a number of rows of corn, quite from bottom to top, taking off all the blades at the usual time of pulling blade fodder [from below the ears.] My recollection of this experiment is, that this last is the most unprofitable management of any that I have mentioned in this communication—not being practically acquainted with any other modes of managing the corn crop with a view to saving the fodder.

I will suggest to your readers, the propriety of extending the experiments so as to test the relative profit of cutting down the corn, fodder and all, just before the fodder would die and dry up on the stalks; or rather at the time of pulling fodder. Those who have secured corn and fodder in this way, generally approve the practice, but I have not seen that any person has made a fair experiment by actual weight and measure, which is the only way to avoid delusion.

It now occurs to me, that I once made an experiment on wheat, that bears some analogy to this practice. In a large field, two adjoining squares were accurately laid off to the same size, where the wheat on both squares was supposed to be equally good. One square was reaped with a sickle, about three days before ripe, the time is not certainly remembered, when the grain had just attained the dough state, and dried and secured separately. The other square was left to get full ripe, when it was reaped as the first, in the morning whilst moist with dew, to avoid shattering—I do not think a single head was lost in either square. When both were perfectly dry, they were each very carefully thrashed, cleaned, and weighed separately. The parcel which had stood to get fully ripe, weighed so much more as perfectly to astonish me. The result was stated to my father, who said he had tried the same experiment several times with wheat, and once with barley, and it had always turned out much in the same way—but on carefully picking up all the heads of wheat that were left on the ground, upon an adjoining square which had been well mown and got in as common, we supposed that rather more good wheat would generally be housed by cutting when fully in the dough state, than by suffering it to get fully ripe, when it would inevitably shatter and scatter more than in the dough state.

CHARLES WOODSON.

[The foregoing experiment on corn and fodder, is precisely of the kind that is wanting to decide this and many other controverted points in agricultural practice—and which, when sufficiently varied and re-

peated, will serve better to remove doubts, and establish valuable truths, than an hundred times as much space occupied by general reasoning, and deductions from untried, and therefore doubtful premises. This experiment is only deficient in one respect—the long time which has passed since the facts were observed and recorded. But though this lapse of time lessens the force of the result, by permitting doubts to rise of something having been forgotten, such doubts are in some measure counteracted by the internal evidence of accurate and particular observation, which the manner of Mr. Woodson's statements carries with them. But even if this experiment had been recently made, and was free from every objection on the score of accuracy, it would need confirmation (as in all other cases) by other experiments made for the same object, and by different persons, and under various circumstances. It is to be hoped, that even if none of our agricultural societies will promote the institution of regular courses of experiments on doubtful points, that enough individual farmers will make experiments on the effects and cost of gathering fodder during the next season, as to settle this most important question. If the absolute loss of labor in this usual and long prevailing practice of Virginia is as great as we have supposed, and even half as great as may be inferred from the result of the experiment above, the amount of the whole annual loss and tax so paid, if saved, would be enough to defray the cost of constructing all of the canals and railways now in progress in the state, and the expenses of the General Assembly to boot.

The experiment on reaping wheat green, (or in the dough state) though less accurately observed, and reported in still more general terms, agrees in the main with our own opinions founded on the practice of reaping green for about twelve years. We have never made any one accurate experiment on this matter—and should not have supposed the difference to be near so great as is stated in general terms above: but the conclusion reached and acted upon, was the same as that which seems to be supported by Mr. Woodson's experiment, viz. that however great may be the loss from the shrinkage of the grain when reaped green, there is much greater loss, on the average, from waste by permitting wheat to stand until ripe.]

GENERAL RESULTS OF THE LAW OF ENCLOSURES IN VIRGINIA.

In every country, and in every age, there have been found existing some preferences given by government to the employment of particular kinds of capital, or of industry, at the expense of others: and however unjust, or unfair, may have been these legal preferences, they have, at least, rarely failed to produce their first and immediate object of an increased production of the commodities thus favored, or greatly increased profits to those persons engaged in the business—and more generally, both these ends have been more or less obtained. But if after a full trial of such legal preference to any particular branch of production, for many years, it should appear that both the amount of the production and its net profits had actually decreased, then (it might be supposed that) the condemnation of the legal policy might be safely left to the persons intended by

it to be favored, or to the most thorough opposers of the principles of free trade and industry in general.

The law of enclosures and its effects, exhibit a striking example of the long continued operation of the preference given by our law to the business of cattle raising, at the expense of grain raising—of a preference of grazing, to tillage. If then the policy is of any value to even the favored class, whatever evils it may produce, there should certainly be seen this one good—increased products from live stock, and increased profits to the owners. Upon this issue, we are content to test the value of this part of the policy of Virginia, and to abide by the decision, even on this partial and limited view of the subject.

Virginia is not the only country in which the interests of tillage have been sacrificed to those (real or supposed) of pasturage: but generally, the effects have been beneficial to the business and the persons so favored, however injurious to other classes, and to the general interests of the country. Here, we are content to reap all the evils of this kind of policy, without deriving any of the benefits found elsewhere from such a departure from right and justice.

In the highlands of Scotland, owing to the peculiar circumstances of the country, the profits of sheep raising have been found to surpass all other returns of agriculture. The consequence has been, that tillage has been made to give place to pasturage. Thousands of small farms, formerly held by tenants tilling the soil, have been thrown together and converted to extensive sheep pastures, in which no human population remains save a few shepherds, and scarcely a single cottage, where there were formerly hamlets and villages, filled with numerous hardy laborers, with their wives and children. The sheep have eaten out the men. This state of things has served to drive from their homes, and compel the emigration of a people the most devotedly attached to their native land, and who would have preferred any fate short of starvation in their own beloved country, to banishment from its shores forever. But in thus exchanging a population of men for flocks of sheep, (however the change may be deplored by the philanthropist and patriot) there has at least been obtained the *gain* expected in wool and mutton.

In Ireland, where tythes are levied upon every product of tillage, and of the small land occupier who is necessarily a tiller of the soil, the products of grass land and live stock, have been kept free from this oppressive burden. The effect of this unjust exemption, (unjust if the nation is to bear the burden at all) has been, of course, to direct an undue proportion of land and capital to the raising of cattle. But though the effect of this state of things, is to keep out of tillage (the more profitable use, but for this exemption,) a vast extent of rich land—to increase the sufferings and the discontents of the oppressed and brutalized peasantry—still the expected gain is found to the graziers in large products of cattle, and large annual exports of beef, butter and cheese.

In Spain, the interests of the owners of pastures, as well as arable land, have for centuries been sacrificed to the established policy of the *mesta*, of which

an account has been given in our last number. But though in this policy, as strange as it is unjust, the interests of tillage and even of resident stock-owners are sacrificed, to advance those of the owners of the migratory flocks—and though the general interests and public prosperity have been greatly impaired by this destruction of private rights—still the owners of the wandering merino sheep at least were fattened by the spoil, and their business prospered while all others suffered. If Spain remained poor, its soil untilled, the country but half populated—yet there was some little compensation found in the facts, that the policy which caused these evils also served to preserve the most numerous and valuable flocks, and to produce the finest wool in Europe.

Where, in Virginia, is the gain or advantage, private or public, to compensate in the least for the interests of tillage, and the rights of landed property, having been sacrificed to the interests of grazing, and the benefit of stock owners? The whole soil of the state is rendered by law a grazing common, for the use of every one, unless when secured by a "lawful enclosure," of enormous and useless expense, and which after all, can never be made a practical safeguard against trespassers. The cost of this policy to the owners and tillers of the soil, has been already and frequently discussed in this work, and is not now under consideration. The present question before us is, *what do the stock owners gain from the use of their legal privileges?* Let the general and notorious results speak in answer.

In the eastern half of Virginia, where the oppression of this system is most severely felt by land owners, there is not, and has not been for many years, any surplus product whatever derived from the grazing of live stock of any kind. So far from exporting any such commodities, we buy from other states very large quantities of salted meat, butter, cheese, leather, candles, and soap. The supplies of hogs and fat oxen brought annually from the west in droves are enormous, and have long been increasing—and most of our horses and mules are now obtained in like manner. It is a fact also worth notice, that the hogs thus driven to us 500 miles, are generally raised in clover fields, or within the farms and on the means of their respective owners, and not by the benefit of the "wood, range," or grazing in common, held so essential in Virginia. We also buy barrelled pork from New England, where the hogs are generally kept altogether in sties, and had no benefit whatever from grazing, or running at large.

It is unnecessary to carry these notorious facts more into detail. Every one knows the general truth, and has some idea of the magnitude of our import trade in live stock and their products, and that this trade has commenced, and has been regularly increasing to its present enormous amount, under the operation of our law of enclosures, and the preference it gives to stock raising. If then the system has brought so little benefit to the kind of property and its owners which it was specially intended to favor, and is still supposed to favor, we ask where are the benefits to be found, which are paid for so dearly by land holders, and by the general interests?

From the Cultivator.

SINGULAR APPLICATION OF GRAFTING.

New-Paltz, Nov. 3d, 1834.

Sir—I have a very valuable apple tree which had the bark eaten off a few inches above the ground, by mice, in the winter, and I took the following method to save the tree. I took four small twigs from another tree, and engrafted them below the wound, in the manner of side grafting, and loosening the bark above, bent the twigs and slipt them under the bark until they came parallel with the body, then covered them well by banking the dirt above the wound and grafts. I left the earth around one season, then cleared it away, and found two had taken. These have commenced to form new bodies, and the tree, from all appearances, is as thrifty as ever, and the twigs have grown in two years to the bigness of your thumb.

I am, dear sir, your humble servant,

ABRAHAM STEEN.

J. BUEL, Esq.

ON THE CONDITION OF FARMERS ON POOR LANDS.

To the Editor of the Farmers' Register.

Caroline County, Va., January 21, 1835.

I have much more to say to you than I have ability to dictate, or time to write. I do not know that I should ever have troubled you with a letter, but finding (however I may applaud the value of your work) that you have not as yet fully reached my case, I cannot think of suffering you to go on, without once throwing in my plea, and, as I verily believe, that of the greater part of the farmers in my neighborhood. I am fully aware, sir, that it would be the height of folly to expect efficient aid from you or any other person, without fully stating our case, however deplorable, however humiliating. I must confess, when I read the communications of Mr. —, Mr. —, Mr. —, &c., who tell us of their systems, of their farms, of their thousands of bushels of corn and of wheat, and their tens of hogsheads of tobacco—of their horses and oxen, of their wagons and carts—I am almost ready to conceal *our* poverty and wretchedness. But, sir, in our case, poverty has overcome pride; and I hope those gentlemen, as well as yourself, will rather pity than laugh at our condition.

When I was a small boy, more than thirty years ago, the three-shift system, so called, was generally pursued—small “half-shares” were the ploughs—large stocks of cattle, sheep and hogs—corn and wheat were the crops, and a manured lot for tobacco, and another for cotton. The land being clean grazed, the half-share answered the purpose of listing, and ploughing through the season. The land was laid off both ways from four feet to five and a half each way—the land was generally laid off with a view to facility of ploughing, rather than a regard to prevent its washing away by rains. It was necessary to run the plough from five to seven times to complete the row. So soon as the ploughs got over, they were turned about and the whole field cross-ploughed—and so again, and again, until the crop was so far advanced as to require

no more ploughing, which was generally after the silking of the corn was completed. I do not recollect whether the wheat was seeded and ploughed in with the last ploughing of the corn. If I do not, I was informed this had been the case, before the Hessian fly began to injure the wheat crop. All the manure that was raised, was from the stables, and this I can assure you was “prime;” no more litter having been thrown into the stables than was necessary to keep some of the horses from being filthy. This manure was put on the tobacco ground, and in the garden. Corn sold from \$1 75 to \$2 per barrel, wheat at about \$1 per bushel. Orchards then were much attended to by many—apple and peach brandy were sold out to tavern keepers by the barrel; and retailed in the neighborhood by the gallon, or less, at \$1 per gallon. If it be not best to let it be buried in oblivion, I will here remark, that not long since, I was riding alone and reflecting on the past scenes of my life, and I recollected some fifteen, or more, men, the yeomanry of the country, since dead, who were all much addicted to strong drink, and the greater part of whom either died from drink directly, or, as I believe, indirectly.

To proceed: under the system of agriculture above described, the lands which were (I may say compared with much) originally poor, were (most of them at least) reduced to sterility. Many of the hill-sides bordering on creeks or rivers, naturally the best land, were gullied, and past cultivation. As the crops were reduced, the families white and black increased, and the farmer was then compelled to purchase more land, or hire out his negroes, or sell one occasionally to feed the rest. I recollect a profane old gentleman, who was in the habit of selling a negro every year or two, to pay off his scores for corn and meat, who had a large number of slaves, swearing that his negroes should never eat him, but one the other. In this state of affairs, emigration to the west became very common. The man who had a small farm and a large family, whether with or without slaves, who had not been industrious and economical, was the first to feel the pressure, and off he went. His more frugal neighbor, or neighbors, purchased his land, which though poor, afforded a larger field for cultivation, and at least for a time, helped to sustain him who purchased it. In this way things progressed from bad to worse. Our state having reared a large and healthy population no longer able to subsist within her borders, was now losing them with great rapidity. This melancholy spectacle no doubt bore heavily upon the mind of our countryman Col. John Taylor, the sagacious patriot, the unyielding republican, and industrious farmer. Until he, *Arator*, wrote, all here was chaos as to agriculture. He first opened the eyes of many in this part of the country, to see that agriculture ought to, and did embrace more than simply cutting down trees, grubbing and ploughing land. He informed them that there should be system in the management of slaves, of overseers, of enclosing, manuring, labor; in cultivating Indian corn, in ploughing, in the management of all kinds of stock, in fencing, in draining, and many other things too tedious to mention. He, too, recommended, as originating with a gentleman of Albemarle, horizontal ploughing, which though not carried to the perfection recommended in the first volume of your Register by Mr. Bruce, (may his

memory be dear to us,) yet it gave the reflecting farmer great aid in preventing his best lands from washing away.

By this time, sir, you no doubt begin to think, that I shall never finish my preamble, nor state our case—but I will. I was always fond of farming. After reading Arator, I built many castles in the air—I thought if I had a farm, how soon would I make it rich, by deep ploughing, non-grazing, clovering and plastering. It was not long before I bought one, and poor enough it was—originally poor, and much worn. I ploughed it deep and beautifully—horizontally too when necessary. I cultivated my corn according to Arator's plan. I cut off my corn-stalks; had even a *farm-pen*, all my stalks and coarse litter were thrown in it and trampled. It was hauled out in the spring; ploughed in, &c. &c. I seeded my wheat nicely, though not always in single beds, (as he directed)—I clovered the wheat land, or rather I sowed the land in February with clover seed—I plastered some of it: I also plastered some of my corn, and some vegetables in my garden—and what was the result of my plastering? I have never been able, on that land, to discover any beneficial effect from gypsum. I discontinued the gypsum. I found my clover grew pretty well without it on the richest spots, and it either died or was too scattering and small to be of any service on the poorest. I have been going on for something like eighteen years, ploughing well, clovering the best spots, making what manure I could, spreading and ploughing it in, making wheat on the best land, oats on the more indifferent, not grazing except a little on spots in the fall. All this has been done at great expense: the plantation has never any thing like supported me; I have purchased corn and meat every year, and sold but little wheat. I have made no tobacco—and the most I can now say of the farm is, that it *looks as if it were in an improving state*—and I think it has improved a little, but very little, except where I have actually manured it. I pursued the three-shift system under the above regulations. You may be ready to ask, why did I not pursue the four-shift system? I will answer: at first I had not land enough—and again, even under the three-shift, I found in the bottoms, the running brier, and almost every where the sassafras, formidable obstructions to the plough. You may say, from the statement I have given of my situation, and—I believe there are a great many others in my district of country, whose land is as poor as my own—how is it possible that they can live; how can they buy corn and meat, &c., every year? I must be candid and say, my dependence was not upon the cultivation of the soil altogether: my profession required more horses than the farm absolutely demanded, and perhaps I kept more than were needful. Horses you know are the heaviest charge on a plantation. Possibly, had I reduced my horses, my living, &c. &c., to a certain standard, I might have made out to live upon my plantation. How then could I have made these expensive experiments? I hope now, sir, you will begin to see the difficulties a poor land farmer has to contend with, in improving his farm, and living tolerably well. In the first place, it will take about one-third of a large poor tract of land, to produce enough corn for his support, and for the production of wheat enough to purchase all necessaries, and

pay taxes, &c., even with the addition of what little money may be raised by the sale of a hog'shead or two of tobacco. A man with a large family, especially of children, must have milk and butter, as well as bacon—and for this purpose, he must have pretty good grazing. When I ask one of my poor land farmers, why do you not divide your land into *four-shifts*, and try to improve it? His answer is, "bless you, sir, I can hardly make out to live with *three*; I must make out the best I can to raise my children, and give them what education I can, and then they must scuffle as I have done." Can you not plainly see, sir, what is to be the result? The children must begin under the most discouraging circumstances: poverty must be their doom, or they must emigrate to the rich lands of the west.

You may say I have stated extreme cases—surely this cannot be the case generally! Truly I have stated extreme cases, and many such there are: would to God there were not so many. Virginia, sir, is *descending* to a crisis; there is a point below which she will not, she cannot fall. It requires not only your Farmers' Register, with the aid of all your intelligent correspondents—it requires also legislatures of wise, of thoughtful, of practical, of feeling men, who have her interest deeply at heart, to stay her downward course. How many are ignorant of the existence of your valuable periodical? How many are there who *could not read* it if they would? So ineffectual, as yet, has been her system of education for the poor. What has she been doing this twenty years past to lighten or abolish direct taxation? Shall the treasury be forever supplied by draughts upon *poor land farmers*, when their means are more scanty now than they were ten or fifteen years ago, when they seem, as yet, to be yearly becoming more so? What a vast amount of taxable property has in the last five years been removed to the west! How much more will be removed in the five to come, who can tell?

Perhaps, sir, my ignorance may make me bolder. I will ask further, why does she grant charters to individuals for banking institutions, for a pitiful bonus? Why not have a state bank, if any? Why grant charters to rail road and canal companies? Why not project them, construct and let them be the property of the state? How long shall our ears be accosted in election speeches, in county court yards, "hold fast your purse strings; take care of the treasury," &c. &c., as if judicious investments must lead to poverty, or that misers only became rich. To say that the location of this state is not suitable for profitable improvements, is to deny what the first glance of a map will show us.

But I have run from my subject, and that was to call your attention to the difficulties which you have to encounter, in promoting the improvement of all classes in this great state of Virginia; to beg you at least to give us a *start*—here lies the great difficulty—many, very many, of these poor land farmers are industrious men, (when I say poor land, I mean land naturally poor) they would (could they be fully convinced that any system would succeed in improving their lands) go to some expense and inconvenience, at first, to accomplish an end so desirable. They tell us too, "if I had money I could do so and so." If I tell them of Mr. Hill Carter, of Mr. Selden, of Mr.

Rogers, &c. &c., they say, "aye they have rich lands, they are wealthy"—my mouth is shut, and I am constrained to acknowledge the truth. If you will take a ride through some of the middle counties of this state, and see the vast quantity of poor land, and even after all the emigration how thickly settled it yet is—know their names—examine our sheriffs' books, and see what a vast amount of taxation is paid by these poor land farmers, out of their hard earnings and savings, you will begin to think that we claim a great share of your attention.

My paper admonishes me to draw to a close; you will discover I have been more intent upon bringing the outlines of our condition before you in a crude manner, than polishing with a critic's pen.

T. B. A.

[The foregoing statement of the writer's experience and disappointment in the attempt to enrich a soil naturally poor, is an apt illustration and striking testimony of the truth of the positions maintained in the *Essay on Calcareous Manures*, viz: that soils of that kind cannot be enriched above the measure of their natural fertility, by vegetable and other putrescent manures, without making use also of calcareous manures, the want of which latter ingredient is the sole cause of the unimprovable nature of these soils. There are but few persons who have long labored to improve poor soils, who will be as frank in confession as our correspondent—and there are not many, having that sanguine temperament which is essential to make zealous "improving" farmers, who can be induced to believe that their past efforts have been thrown away, and that there is no hope from persisting in similar attempts. But if these objections did not serve to keep them silent, there would be hundreds who would make statements of general failure and long continued disappointments, not less marked than those given above. If T. B. A. could have applied marl or lime to his land, he would have thereby cured its natural defects—and his other materials for improvement, vegetable matter, clover, and gypsum, would have become available, efficient, and profitable.]

We are aware that this doctrine is so unpalatable to many, that it has to expect but small favor, or scarcely serious consideration—and indeed its being even uttered here, may be deemed a sort of treason to the cause of agriculture—to the progress of general fertilization, which almost all the addresses to agricultural societies, and essays on agriculture in general, concur in declaring to be easy, sure, and profitable. We at one time held the same opinion—and it was with painful reluctance, and not until after years of mispent and lost labor, that we became satisfied of the error of expecting to enrich such soils as are naturally poor, with profit or durability, by vegetable matter, or putrescent manures alone. If T. B. A. had (on such soil) practiced the milder four-shift rotation, and had prevented all grazing, his success would have been not much greater—perhaps less, if estimating the greater cost. We know of two different experiments, carefully conducted, which show by the measurement of the corn produced in each rotation, that almost no increase has been found in a course of near twenty years, during

which the land had been under very gentle tillage, and secured entirely from being grazed. In one of these experiments, where the four-shift rotation of *Arator* has been strictly preserved since 1815, there has been an actual and considerable lessening of the product, as tested by the crops of four successive rotations. It should be stated, that this diminution is supposed to have been caused by the ploughing having been too deep (six inches) for so shallow a soil—but it was not so deep as was advised by *Arator*, nor as deep as was found safe and beneficial on adjoining land, after it had been made calcareous.

Our doctrine may perhaps be met (as it frequently has been) by the objection, that it sentences to hopeless sterility all lands naturally poor, and which have not command of lime or other calcareous manures. This may be an important and lamentable fact, but it is not an argument against our position, but the reverse. If a farmer owns poor land so unfortunately constituted and situated, that no considerable or profitable improvement can be made on it, the sooner he is convinced of the truth the better, that he may cease to labor for unattainable objects, and direct his energies where their exercise will be amply rewarded. If half the expense which has been thrown away in such fruitless efforts at fertilization, even in the last twenty years, had been given to the judicious application of calcareous manures, there would be now a vast difference in the aspect of Eastern Virginia, and of the amount of profit gained by every individual concerned in these different practices.]

From the London Quarterly Review of Nov. 1st, 1834.

HORTICULTURAL CURIOSITIES OF JAPAN.

If we assume the perfection of the arts of tillage and manufacture as a test of civilization, Japan may at least compete with any oriental nation. Mr. Meylan places it higher than any. He extols their field cultivation, but they appear to neglect their great opportunities for horticulture, as far as the kitchen and the dessert are concerned. As florists they are conspicuous, and the beauty of the productions of the soil in this department is known to every possessor of a greenhouse and proprietor of a camelia. The singular art of producing miniature samples of the larger products of vegetation, unknown, we believe, in Europe, is practised by them to an extraordinary degree. Mr. Meylan speaks as an eye-witness of a box offered for sale to the Dutch governor, three inches long by one wide, in which were flourishing a fir-tree, a bamboo, and a plum-tree, the latter in blossom. The price demanded was twelve hundred florins.

From the New York Farmer.

LOUBAT'S VINEYARD.

This vineyard, on which a large amount of money has been expended in foreign vines, was recently sold for the purpose of being divided into lots for cottage residences. It is six miles from Brooklyn, lying on New York Bay. There are upwards of 40 acres, which were sold for \$15,300. The vines were, we presume, considered of little or no account, and thus has ended the last extensive experiment in attempting to acclimate the foreign vine in this country.

From the Complete Grazier.

FIGURES AND DESCRIPTIONS OF LORD SOMERVILLE'S DRAG-CART.

[The marks referred to in the following description as accompanying the cuts, but which do not there appear, were also omitted in the original engraving from which this was copied. The error however is not so important as to prevent the figures being perfectly understood by every reader.]

Fig. 1.

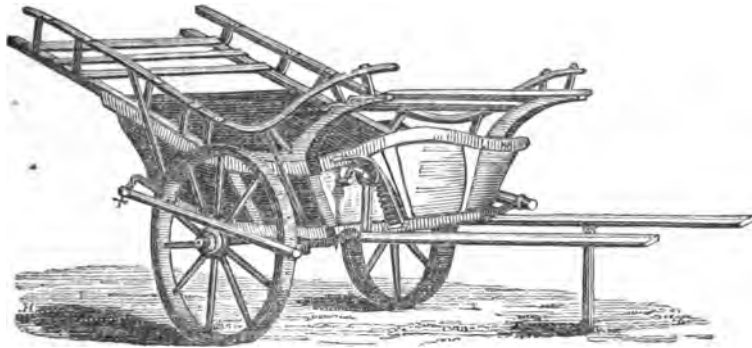
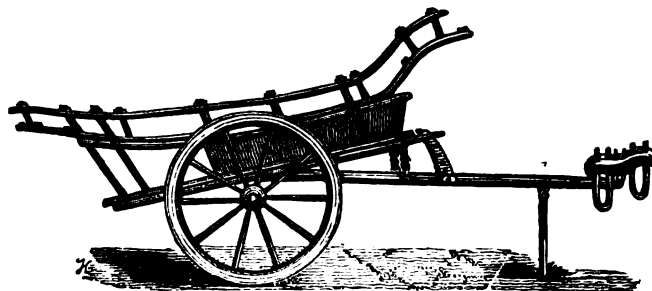


Fig. 2.



The cut above, Fig. 1. represents a front view of a *drag-cart*, invented by Lord Somerville; selected from Vol. II. of "Communications to the Board of Agriculture."—Fig. 1. is a cart calculated for draught, by a *single* horse in shafts; *b b* is a *friction-bar*, or drag, that is fixed behind by a chain, and before by a tooth-rack, delineated at *b d*, which catches on a staple, and by means of which the pressure may be regulated by the driver, according to the steepness of the descent. *c* is a toothed rack, fixed in the front of the cart, for regulating the position or centre of gravity of the load. In this figure, the friction-drag is placed lower on the wheel than Lord Somerville originally intended, in order to divide the pressure and friction more equally on the opposite side of the wheel: thus the action on each is diminished, and the risk of over-heating and destroying the friction-bar is rendered less than if the whole pressure were applied in one point at the top of the wheel.

Fig. 2. represents a side view of the same *drag-cart*, designed to be drawn by two strong oxen, with a pole yoke, and bows, the friction-bar being removed. In this figure, a more simple mode is adopted for regulating the position or centre of

gravity of the load, as described at *a b* by the curved iron, perforated with holes for receiving a pin, to keep it at any required height: *c* is a small chain to prevent the cart from going too far back in fixing it: and the letters *d d* denote the upper part of the cart, which is extended to contain bulky or heavy loads.

The following are the advantages to be derived from the adoption of the drag here described:—

1. The degree of friction and pressure may be expeditiously adjusted to the steepness of the declivity; so that the cart will neither press forward, nor require much exertion in the draught.

2. The friction is judiciously applied to the wheel, in such a direction, that a given pressure will produce twice the effect in retarding the progress which it would do if it had been immediately applied to the body of the cart, or to the axis.

3. The apparatus is capable of being arranged with such facility, that it may be instantaneously adjusted, without stopping the cart, or exposing the driver to danger.

4. It may also be remarked, that still greater benefit may be derived from this invention, by applying it to *both* the hinder wheels of *wagons*;

thus, the resistance may not only be proportioned to the steepness of the declivity, so as to prevent most effectually the damage done to the high roads, and the unnecessary labor of cattle, when drawing loaded carriages down hills; but it will also remove the danger of the frequent accidents to which drivers are exposed; and will save that time, which is now of necessity lost, in locking and unlocking wagon-wheels.

From the Ohio Farmer.

BLUE COLORING MATTER FROM STRAW OF BUCK WHEAT.

We intended to have mentioned this subject earlier in the season, in order that some of our readers who had buck wheat upon their premises might try the experiment and ascertain more satisfactorily the facts of the case. But we will bring it forward now; perhaps it may be recollected in its proper season. The method which has been recommended for preparing the coloring matter from this plant is the following—cut the stems before the grain is fully ripe, and spread them upon the ground exposed to the sun and thus exposed until the seeds drop off with ease. When the grain is separated from the stems, they are thrown into heaps, moistened with water, and left to ferment to such a degree, that decomposition takes place, and a blue color is developed. It is then formed into balls or flat cakes which are dried in the sun or by a stove, after which if the balls are boiled in water, they impart an intensely blue color which is not effected by vinegar or oil of vitriol. It may be converted into red by adding an alkali as potash or soda, with nutgalls it strikes a blacker color, and a very fine green is afforded by evaporation. It is said that stuffs dyed blue by this preparation retain their colors well and appear very handsome.

We have never prepared any coloring matter from this plant, nor can we vouch for the truth of the above statement, but certainly, we think it worth a trial.

From the Southern Planter.

REMARKS ON THE MANAGEMENT AND VALUE OF GAMA GRASS.

Mr. Bartlett—I beg you to receive my thanks for your kind attention in forwarding the back numbers of your valuable periodical. Since I have had the perusal of them, I am perfectly informed of what my loss would have been, had I not received them. On looking over those numbers I discover in one of them, some remarks on, and inquiries respecting the *Gama Grass*. Having been the first individual who was so fortunate as to get the public attention directed to this plant—which I am compelled to view, after an assiduous cultivation of *ten years*, as of extraordinary value to the agriculturists of the south, I feel myself competent to answer those inquiries satisfactorily, and I think, to do away the imaginary objections suggested.

With me this plant is found to grow in every kind of soil: but certainly to exhibit its extraordinary productiveness, the soil must be good, naturally, or made so by art. And in addition, the presence of calcareous matter is essential. As it regards its growth, after being cut monthly, I am yet to learn the name of a plant that equals it, if the soil is properly prepared. I have cut it twenty-

three inches after fifteen days growth. At this stage, I am (after years of experiments made to determine this point,) now fully convinced that in the production of milk, and butter—two of the most agreeable *et ceteras* of a comfortable table, it is not excelled even by the wide pea vine, so long celebrated for the production of those two articles, in their richest and most delicate state.

For the purpose of making hay or dry forage for the winter support of animals, this grass has been well tested. See a communication in that valuable agricultural paper, "The Baltimore Farmer," of the 9th of September last. In curing this grass for hay, it ought to be cut at thirty days growth, when it may be taken from the scythe and stacked, if mixed with equal quantities of good oats, rye, or rice straw, each layer of grass is laid on (or what is better, mixed as stacked) sprinkled with salt, when it will be found to cure admirably, and impart a great portion of its highly aromatic flavor to the straw, increasing the mass of excellent forage.

In cutting this grass at thirty days growth, the sickle is certainly the most economical plan, and sufficiently expeditious for soiling; but I can assure your readers that but little practice is requisite to learn an individual to cut with the scythe. I have had it cut both ways without any difficulty.

I notice the remark, that as the roots progress in age, the blades come out from around the edges, and leave the centre of the root bare. To this objection I will candidly communicate a piece of information I lately received, and which obliges me to believe it is entirely owing to our mode of cultivation that this takes place. About two months ago, a most observing planter called on me for the purpose of having some conversation on the subject of this grass. This peculiarity was noticed; he immediately remarked, that in a patch of the gama found in his field, in its native state, about one acre, there was not one root to be found in the abovementioned situation; that a remark of mine had induced a close examination; and added that it was entirely owing to my mode of cultivation that the roots exhibited this appearance. That I cultivated to produce root, by giving a distance that caused the root to spread to an unnatural breadth, and which prevented that thick coat of foliage found attached to the plant in its natural state; that none of the roots found in his patch, which to his knowledge is fifteen years old, and appeared as old and luxuriant when he settled on the land (black limestone land) could have been originally more than twelve inches apart; that when he first noticed this plat of grass and attempted to break it up, with the plough, the ground was totally occupied with the roots, and which prevented his effecting the destruction of the plat; that finding his horses, mules and oxen preferred it to all other grasses, he let it stand for hay, and from it made annually several stacks. The statement appearing to carry weight with it, I went the next day and examined for myself, and found the whole entirely correct; and am now induced to believe his observation judicious. In consequence of this circumstance, I shall plant a lot of gama at twelve inches from plant to plant, and let trial determine the correctness of theory. During a ride last month through a part of the Choctaw country, I found this grass in greater luxuriance than I have ever been able to produce it, and uniformly I

found the roots close together, and the blades not more than half the width of that cultivated as I have done. Giving the roots so much distance, I am now assured, produces a worse growth of blade.

As regards the important point, viz. the nutritive quality of this grass, in addition to my own experience, which has established its highly nutritive character, I beg leave again to refer to the communication before mentioned. I have frequently stated my own opinion on this subject. I am happy to find it completely corroborated by others. Your agricultural friends have nothing to fear in the cultivation of this grass, but the difficulty of getting seed to plant. I shall give the result shortly, of a trial to produce this grass in the highest perfection, made this year. To the mode of planting and preparing the soil the singular production of vegetable matter must be attributed, the season has however, been remarkably fine with us for grass and weeds.

PLANTER.

ON THE ADVANTAGE OF APPLYING GYPSUM IN QUANTITIES UNUSUALLY LARGE.

To the Editor of the Farmers' Register.

Fauquier, Feb. 4, 1835.

In a letter I addressed to you in August last, I told you that I entertained the opinion that poor land should have *twenty bushels* of Plaster of Paris put upon it, if the proprietor desired to improve it *speedily*; and I promised to give the reasons on which my judgement approved the use of that quantity.

In the winter of 1828-9, I followed a poor field of 30 acres with the view of improving it; but for reasons not necessary to be stated, 8½ acres were put in corn, at 3 feet by 4. In the hills I had 2½ bushels of plaster put. A part of the corn was *rolled*, and on the remainder the plaster was thrown dry. In the fall of 1829, wheat well rolled in plaster, was sown on this land, and in March clover seed were sown. In April, 1830, I ordered 30 bushels of plaster to be sown on the field of 30 acres; but fearing that the sowers might oversow on the best of the land and leave the poorest without any, I directed that about an acre, (a cove that received the deposite from an adjoining wood) should not be sown till the balance of the field had been. My fears were realized: when they finished sowing there was no plaster for the omitted acre, and none was put on it for some time. About the 20th of May clover attains its greatest growth. From the time that grass took a steady growth to the period of maturity, many persons observed that my corn (i. e. of the previous crop of 1829) had been manured in the hill. The clover that grew on the hills in which the corn had been planted was at full growth, three feet high, while that on the intervening ground was not more than five or six inches high, and of pale sickly yellow color. The next spring the difference in the vegetation on and contiguous to the hills was still very great.

In order to ascertain the quantity of plaster which had been used, per acre, in the corn hills, with such manifest benefit, I ascertained the number of corn hills in each acre, doubled that number for the number of corn stalks, allowed 1½

inches square for each stalk, and then the number of square inches in an acre, which multiplied by 8½ will give the number in the ground planted in corn. The ratio between the space occupied by the corn stalks and one acre is as 1 to 22, and a large decimal. At the rate then of 22 bushels of plaster to the acre, was it used on my corn. The benefit was as manifest as if manure had been put in each hill, and was distinctly to be seen for two years. The third year the field was put in corn—the plaster scattered, and, of course, I could not discern a continuance of advantage from it, but as long as the earth was undisturbed the increased quantity of grass and the richness of its verdure on the spots on which the corn had grown was strikingly manifest. The corn was not killed. I then thought, and now think, killing an entire loss of the labor employed in the operation, if not injurious.

There are some other facts which tend to prove the utility of using plaster more largely than the present stinted allowance of half a bushel to the acre: but writing is a laborious employment, and I am willing to rest my opinion on the leading facts I have stated, and the few following observations. In England 400 bushels of lime are used on an acre with great advantage—in Pennsylvania 200 bushels are used, and often upwards of 300. The valuable principle of lime and plaster is the same, as I have been informed, but in what ratio it exists in each I do not know; but I suppose it cannot be in a greater ratio than 20 to 1 in favor of plaster. If this be the ratio, then my opinion that 20 bushels of plaster may be, and ought to be, used on an acre of thin land, is strengthened by the quantity of lime used in the countries I have mentioned. In Pennsylvania a greater quantity of lime would be used, I presume, but for the expense of it. They could safely employ it to the same extent as in England. I shall use plaster as largely as my means will allow.

I also expressed the opinion to you last summer, that the mere growth of corn, wheat, &c. *did not injure* land. The reasons are obviously correct. If we compare the weight of an acre of forest with the largest product of an acre of the best river lowground, or manured upland, for 150 years, we shall be satisfied that the difference of weight, (or of *substance extracted* from the earth) in favor of the trees is very great, while the woodland is best. It will be said that the leaves of the trees increase the fertility of wood land—but look at the small return made to the earth by the leaves of one tree, and we must be satisfied that but very little can be derived from them—too little to be received in computation when compared with clover, &c. &c. Further, it is a generally received opinion, that wheat fallows improve land, while it is as generally known that corn, oats and buckwheat injure it. But it is not owing to the plant—but the mode and period of cultivation necessary to rear it, that is injurious. Wheat does not injure, because when the earth is prepared and has received the crop it is no more disturbed, and the action of the sun upon it is very slight. In the cultivation of corn, and preparation of the earth for oats and buckwheat, it is made so light as to receive the *heat* to the depth of several inches, during the spring and summer, when the sun acts with such power on it. *Heat* is the great destroy-

er of the vegetative or nutritious principles of the earth. Fall crops do not injure land as much as spring and summer crops, for the reason that the action of the sun is feeble—the nights are long—dews are copious, and by the spring the earth is so compact as not to receive the rays of the sun, and is soon shaded by the wheat, &c. For these, among other reasons, I am satisfied that the earth is not impoverished by the growth upon it.

The last observation I have made, to wit: that "heat is the great destroyer of the vegetative or nutritious principles of the earth," requires some remarks. Make the richest earth into bricks—then pulverize them, and you will find that seed will not sprout in the dust, or if they sprout they live but a short time and perish for want of food. The valuable principle is killed or expelled by heat. Take a piece of plank, say 12 inches square—place it on a gall; let it remain for one year, and then sow seeds on the place covered by the plank and on the conterminous earth, and you will find the plants on the space covered by the plank much more vigorous than their neighbors: indeed, that they will survive through the summer, and yield fruit, while those on the earth which was not shaded will sprout and soon die.

JOHN ROBERT WALLACE.

ON THE CULTIVATION OF CORN.

To the Editor of the Farmers' Register.

Fauquier, Feb. 4, 1835.

I have been a farmer for five years only, but as my mode of cultivating my land differs from that usually pursued, and has returned me a larger reward than the same quantity of labor bestowed on even better land, I will communicate it to you. Impressed with these truths—

That heat is a great destroyer of land—

That deep ploughing is indispensable—

That the roots of corn ought not to be injured or disturbed—and

That the corn crop ought to be so cultivated as to make the best crop of wheat—

I accordingly have my land broken up as deep as two and three good horses can do it. I require the sod to be as carefully turned as if for fallow for wheat. The ground is then well harrowed, the harrow running as the plough. The usual mode is pursued in laying off with a very small shovel-plough. The corn is planted, (from the 12th of April to the 1st of May,) and as soon as it is thinned, I use cultivators of five teeth, (set in as in a triangular harrow,) made of harrow iron—the teeth flattened for two inches, sharpened and turned so as to enter the ground. With these implements my corn is worked three and four times. But if there has been much rain, so that the grass cannot be kept down by them, or if the ground be very hard, then I direct the double shovel-plough (about as long as the hand, and one-third broader) to be used; but if there be time after it, I again use the cultivator, in order to level the land and prevent washing. In the use of both these implements, orders are given not to turn a sod up, and if it be done, to replace it. By this mode a very small portion of the earth is exposed to the action of the sun; the roots of the corn are not wounded, and can readily extend themselves in their search for food; the moisture of the earth is longer re-

tained; the ground does not wash, and the fine vegetable mould made by the rotted grass and roots is preserved from the sun for the nourishment of the corn and the following crop of wheat.

Having gathered my fodder in the old mode, when ready for sowing wheat, I have the corn cut and stacked in small stacks—the same ploughs running at the same depth with the ploughs used in the spring. On the land thus prepared, my wheat is sown and harrowed in. The crops of wheat are decidedly better than those put in with that mischievous shovel-plough, which (next to negro labor, that ever has, and ever will carry desolation and ruin in its train,) is the greatest enemy to good crops and good land, that the human intellect can devise in the form of an implement of husbandry.

This mode of preparing the land for wheat, has these advantages: the decayed grass, &c. is thrown to the top, nourishes the young wheat, preserves it against frosts and winds, and when hard freezes occur, owing to the depth of the ploughing, the water is dissipated, and the body of earth is too heavy to be affected by any but the severest spells of weather. When the crop of corn has been properly cultivated, and the ground prepared as above, the crop of wheat is not much inferior to a fallow crop: the reasons must be obvious to every one.

As to the corn crop, I am not left a doubt of its advantages over every other I have heard of. I have never failed in a crop. If the season be wet, the water sinks to the sod, where, owing to the grass and roots, it is retained by them by absorption, and is prevented from passing off rapidly. The earth too, being more compact than when the shovel-plough is used, the water is much more slowly evaporated, and in hard rains, owing to this cause, and the smoothness of the surface, but little of the soil is washed away.

In drought when other fields of corn are exhibiting its serious effects upon them, corn cultivated in the manner above mentioned, shows but little, if any injury from it. Wherever that destroying enemy, the shovel-plough, is used in dry seasons, its injury to the crop is shown after each ploughing, in the withered blades and sickly color of the corn. Owing to the depth they run, the roots of the corn are wounded, broken, and huddled together in bunches, instead of being expanded through the ground as the radii of a circle.

Is it not surprising to see how almost universally the notion prevails, that it is serviceable to break the roots of corn? They do not seem to comprehend the offices of roots. One set of them is to support the plant; these shoot out when the ear is forming, and descend perpendicularly into the ground; the other, shooting out horizontally are purveyors—they spread themselves through the earth in search of food; but if they are bruised or broken, they cannot do their duty, for they must first be healed to enable them to do it, and then being forced altogether they must receive less nourishment for themselves and food for the stalk, than if they ran through a circle, doubling in its diameter, any one of the roots. What would be thought of the reason of a man, who declared it to be his opinion, and practically enforced it, that the best mode of fattening a bullock was to wound his tongue, disable his jaws, and break his teeth whenever he reached his head towards food? Can

that means or reason be better than his, who maintains, that it is advantageous to the growth of corn to break its roots, to deprive it of food—to make it sick—to close its mouths—to starve it?

I give you these views in conformity with the promise I made you, and regret that I have not time to give them with more system, and in better dress. But such as they are, I am willing for them to undergo the ordeal of rigid scrutiny. If they be erroneous, I shall be benefited by the correction—if they are true, others will be by their publication.

JOHN ROBERT WALLACE.

ON THE CONSTRUCTION OF FIRE PLACES.

To the Editor of the Farmers' Register.

There might be a great saving of fuel among us, (for this is a subject that certainly merits attention,) by a proper management of our fire-places, and especially those of our cabins. These are generally so large, burning almost a cart load of wood at a time, that nearly all the heat escapes up the chimney. If they were made smaller, and on the same principle as those of our dwelling houses, half the wood would answer the purpose; and of course, half the labor be diminished in getting it. But even here, although the general form and principle (which appears to be all that is aimed at) is obtained, yet even these are not constructed according to the just proportions and dimensions of the improved fire-places of Count Rumford and Dr. Franklin; as it will appear from the following figures, which illustrate the difference between the old and the improved fire-places.

FIG. 1.

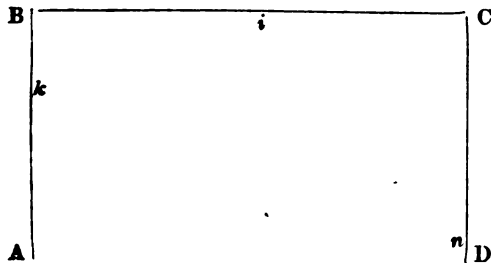
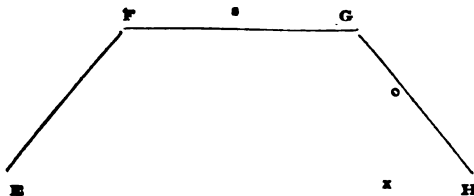


FIG. 2.



A B (fig. 1) is the opening in front, B C the back of the old fire-place, A B and C D the covings, and A B C and D C B the angles made by the covings and the back.

When altered, E H (fig. 2) the opening in front, F G the back, E F and H G the covings,

and E F G and H G F the angles made by the covings and the back.

In constructing this fire-place, the angles E F G and H G F made by the covings and back, should be 130° , the fire-place six inches deep from front to back, in small rooms; and from eight to twelve inches in large rooms. It is thought by some, that an inch to every foot of the room in breadth is best—thus, if the room be twenty feet square, the fire-place will be twenty inches deep, measuring from front to back, along the place where the fire is made. The vent for the smoke four inches wide generally; varying, however, with the size of the opening or mouth of the fire-place. The back should be built erect (and not started inclining inward as is common) as high as the ordinary height of the wood when the fire-place is full; then projecting inward, and run in that position to within four inches of a line drawn perpendicularly from the lower edge of the mantle or iron bar to the back, then abruptly sloping back—this is the height of the back, and the point at which it begins to form the throat, or hollow place above the vent. When the back begins to slope inward from the bottom or foundation, it not only reflects the heat down against the floor, but it also obstructs the ascending smoke.

A fire-place of the above construction, consists of the following parts, (which we shall here enumerate, in order that the following remarks on the nature of the alteration and improvement of the old fire-place, may be more clearly understood)—the *hearth*, the opening in front or *mouth*, the *jamb* or *coving*, the *back*, the *mantle* supported by the iron bar, the *vent* (sometimes confounded with the throat) through which the smoke enters the throat, the *throat* itself above the vent, the *flue* or funnel, through which the smoke ascends into the air, and finally the *shaft*, or what is commonly called the chimney itself. The principal improvement made on the fire-place, was an alteration in the covings; first, in regard to their *depth*; and secondly, the *direction* in which they were run—by running them shallower the back of course was brought forward, and consequently, the burning fuel was brought more into the room, and thus the benefit of the heat obtained. And by running them at an oblique angle with the back of 130° , instead of 90° a right angle, the covings were converted into a reflecting surface, by which the heat which lodged in the corners of the old fire-places, and thence escaped up the chimney, was reflected into the room. The vent next was diminished, by which more heat was retained in the fire-place, and the draught strengthened, (or the chimney made to draw better as it is commonly said) and consequently less liable to smoke.

All these different parts of a fire-place and chimney should be well constructed, and in due proportion; for the heat and smoke is affected by all of them. Thus if the *mouth* is too large, too much air is admitted for the fire, which has the same effect in putting it out or cooling it as too little; and by cooling the fire, of course weakens the draught, and causes the chimney to smoke.

If the *covings* are perpendicular to the back, the heat, instead of being reflected in the room, will be reflected from one coving against the other. Thus if a ray of heat thrown from the centre of the back of the old fire-place at *i*, impinges on the

coving A B at k , it will be reflected against the opposite coving C D at n ; and of course a person sitting in front of the fire, loses the benefit of it, unless he be sitting in the corner somewhat facing the coving. But if a ray of heat thrown from a point in the centre of the back of the new fire-place F G at s , in the same direction as in the former case, and falls upon the coving G H at o , it will rebound in the direction towards x , in front—for the angle of reflection is always equal to the angle of incidence. A person sitting, therefore, before the fire, will enjoy the benefit of a ray so reflected. If the covings be made of a substance that absorbs more than it reflects, a great deal of the heat is lost. They should be made of a material that reflects more than it absorbs, and if possible, of one which does not absorb at all. Dutch tiles, fire-stone, marble, and porcelain are used—common brick and mortar, if it was sufficiently durable, is the best material; which should be smoothly plastered, and kept white-washed, for black absorbs too much heat. The best coving for a fire-place, is that material which is most durable, least liable to crumble, the least absorber, and the greatest reflector, and that which is susceptible of the highest polish, for the more it is polished the more heat it reflects. Any one may be convinced of this, if they will place the bottom of a polished plate of tin (or the bottom of a coffee-pot) by the side of the face, while standing before the fire, so that the ray of reflection may strike the face after it is reflected from the tin: a higher degree of heat will be sensibly felt. When the image of the fire is seen on the tin, then the ray strikes the face. A tin plate would be a good thing to regulate the position of the covings. The mantle also affects the heat and smoke. If this be too high, the draught is weakened, and the smoke pulls out into the room before it reaches the vent: if too rugged in the inner-side, it obstructs the smoke: it should be smoothly and soundly plastered, that the smoke may curl around it on the inner-side.

If the vent is too large, too much heat escapes, and the draught is also weakened—if too small, the smoke is obstructed: if the fire-place is too large for the vent, it takes in more air than can pass up the chimney; as an animal can take in its mouth more than it can swallow: the mouth should ever be in proportion to the vent. It is an established rule in the construction of stoves, and furnaces with grates, that the area of the vent should be equal to the sums of the area of the open spaces between the bars of the grate through which the air is admitted to the fire: but the object here is more to increase the heat within the furnace by a rapid combustion, which is always in proportion to the strength of the draft, which is at its smallness and swiftness, (hence the powerful heat produced by the mouth of the bellows,) and therefore cannot strictly apply to an open fire place, where the object is not confined heat, but reflected. If the mouth was made as small as the vent, very little heat would be reflected in the room, though the combustion would be more rapid. This is well known to those who have been in the habit of kindling a fire made of coal, by placing the kindler before the mouth, so that a small space is left for the admittance of the air, or oxygen. The same may be seen by placing a blanket before the fire, when the draught is suddenly increas-

ed, accompanied with a great roaring, and the combustion goes on rapidly.

Again, if the flue is too large, the draught is weakened, and a quantity of soot is formed; for in this case the flue contains so much cold air, it weakens the draught, and hence not being sufficient to drive out the soot, it lets it fall on the sides of the flue. The same takes place in the channel of a stream, (which has been made use of to illustrate the draught in a chimney.) The stream is always swiftest where the channel is narrowest, (the volume of water being the same,) hence it is able to carry the sand along; but if it suddenly spreads into a large channel by which the stream is weakened, it drops the sand on the sides of the channel, or in the deep holes. The stream is always swiftest in the middle, and frequently runs backwards at the sides, and hence the sand is left there, where the current is weakest. It is on this principle that soot is formed in a flue, of any construction. The draught or current of air and smoke being stronger in the middle of the flue, it drops the soot on the sides where it is weakest. On the other hand, when the flue is small, it is heated all the way up, and the air in it; and thus the draught is made to ascend, by the heat rarifying and raising the air.

If the *throat* is too large the soot collects in it, for the same reason mentioned above. This, however, is an advantage; for if a deep recess be made above the vent, (or a deep throat) nearly all the soot formed may be collected, when it may be swept out. Upon this principle furnaces have been constructed so ingeniously as to clear the flue of soot almost entirely. Any one may notice how soot is collected in holes in the back of a fire place, above the fire, where a brick happens to tumble out: for this reason, the throat, vent, flue, and rough places in the back, should be made smooth. Finally, if the shaft is too long or high, the chimney is apt to smoke, for then the flue being too long to be heated all the way, the cold air in it will cool and weaken the draught, and being heavier too, will press the ascending smoke down the chimney in the room: if too short the wind is apt to blow down it. The size of the shaft should be generally to that of the flue as 4 to 1.

These remarks may serve to show, how the heat and smoke of a fire-place and chimney, are affected by the construction of their component parts.

But the great secret in managing a fire-place, so as to obtain the greatest degree of heat from the smallest quantity of fuel, and to prevent smoking, is the management of the draught. This is easily affected by every part of the fire-place, as well as by other external causes, as the air, winds, groves of trees, buildings, &c.

To understand the *nature* of the draught—it is a current of heated air, produced in the fire-place, as soon as a shovel of coals or a chunk of fire is introduced: which ascends the flue of the chimney, carrying along with it the smoke, soot, and other matter of the fuel: and is formed on the principle of the expansion and rarification of that element. The heat of coals rarifying the air just around them, divides it in into minuter particles, and consequently becoming lighter, they ascend through the denser air up the chimney: this produces a partial vacuum (for there is no real vacuum in nature, though one can be made by art,) around

the fuel, into which, the fresh air rushes out of the room: this being again rarified as the former portion, ascends—and thus a constant current is kept up as long as the combustion goes on. As soon as latent heat becomes sensible, by the collision of flint and steel, and the compression of the air between them, or in other words, as soon as a spark of fire is born into the world, and kept alive by combustible matter, this current is formed around it, by rarifying the air. On the same principle the heat of the sun produces the winds, (according to the theory of Dr. Halley, now generally received.) This is the case with the great east wind which blows continually from east to west, in the direction of the apparent diurnal motion of the sun, and prevails in all the extensive oceans. The heat of this luminary, warming the air under it, (or rather it should be said, warming the earth, and that warms the air by reflected heat—for the rays of the sun have no effect on that medium through which they pass,) rarifies it, and a fresh portion rushes in the partial vacuum, in the direction of the motion of the sun, and thus the current is kept up. This is also the cause of the north and south winds which blow towards the equator: the heat of the sun being hottest there, the air rushes in from those points to supply the consequent vacuum. But to return—the current or draught thus produced by the heat of the fire-place, is supplied by fresh air from out of the room, which if it were made air-tight, would soon produce a vacuum, in which no animal could long exist. But when the air of the room is exhausted, fresh portions are admitted through the doors, windows, and crevices of the room: if all these apertures are closed, the combustion ceases, and the fire goes out. Air is no less important to keep up a flame, than it is to support animal life. The principle of the air or atmosphere which feeds the fire or supports combustion, is oxygen, one of the two gases of which the atmosphere is composed: the other is azote. If the air is deprived of oxygen, it will no longer support combustion—for if a lighted taper be put into a vial of such air, it will be extinguished; but if a bit of wire be dipped in sulphur and lighted, and then put into a vial of pure oxygen gas, it will be rapidly and brilliantly consumed, and the melted iron will sink through the bottom of the vial. The absolute necessity of oxygen or the atmosphere to promote combustion is forcibly presented: if a pipe be admitted to the fire along the floor, having a communication with the external atmosphere, a current is suddenly formed, which rushes violently with a noise from the mouth of the pipe through the fire up the chimney. This shows what a powerful demand the fire has for air, which increases the heat and combustion in proportion to the rapidity of a succession of particles of air introduced to fire; hence, the powerful intensity of heat produced by a blow-pipe or bellows. The combustion, and consequent heat, seems to be also in proportion to the smallness of the aperture through which the air is admitted; but this may be still owing to the rapidity of the current, for this depends upon its smallness. From this it well appears, how much the management of the draught depends upon the air; and as the combustion, and consequently the heat, depends upon the draught, and also the smoke which is driven by the draught, the great nicety in managing the draught will likewise appear.

Although air is so necessary to the fire, too much air, like water, weakens combustion, and consequently the draught, and renders the chimney liable to smoke.

These facts suggest some means for the curing of smoky chimneys. Thus, when all the apertures of a room are closed, too little air is admitted—this weakening the combustion, and that the draught, the latter is not sufficient to drive the smoke up the flue; the consequence of this is, the weight of the external atmosphere presses the smoke down the chimney into the room, especially if the wind blows, in which case the current of wind being stronger than the draught, it puffs the smoke into the room. The remedy is to open the doors, &c., and admit the air: the same happens when too much air is admitted, which cools, and of course weakens the draught, and not being sufficient to propel the smoke, it is pressed back by the external air in the apartment: in this case the doors must be shut. The weakness of the draught is the most frequent cause of smoky chimneys. This is produced in a variety of ways. Very often a weak fire causes the chimney to smoke; for, as the heat and combustion depend on the draught, so the latter depends upon the former: so that when the fire is low, the smoke curls weakly up the chimney. The remedy suggests itself—kindle up a brisk fire.

There is another way in which the draught is weakened, or rather overcome: for the want of ventilation in the upper part of the room. There are always two sorts of air in a room where fire is kept—a light and heavy. The former occupies the upper part of the room, where, if it has no vent, it rushes down the wall to the mouth of the fire-place, and curling round the inner side of the mantle, forces its way up, and by its superior strength drives back the smoke, especially if the draught happens to be weak. There are always two currents passing through the mouth of the fire-place if the room is not ventilated above, as well as through the door; this may be seen, by holding two feathers—one at the top, and the other at the bottom of the mouth of the fire-place—they will be drawn inward: but in the case of the door, one of the currents is going out at the top, (the lighter) while the other (the heavier) is coming in at the bottom, which may be seen by holding two candles, one in the lower and the other in the upper part of the door. The upper one will be blown outward, while the under one will be blown inward. The draught is affected, when several vents open into the same funnel; for the fresh air rushing in through these vents out of adjacent rooms, puff out the smoke: this ceases, when a draught is formed in every vent by kindling fire in the different rooms at once. Straight funnels affect the draught, because the wind is more easily admitted down the chimney to the fire. Large fire-places with small vents affect the draught, and likewise the contrary. The want of ventilation affects the draught, and of course, the smoke. When the draught is weakened in this way, a pipe admitted to the fire, terminating at the hearth or within the fire-place, having an external communication with the air, will prevent smoking. The pipe may be either conducted on, or under the floor. The draught is sometimes affected by having the ventilators for letting out the foul air of a room, too low down above the fire place, (which

by the by is a very good contrivance for getting rid of (foul air,)—the light air just spoken of, rushing through the ventilator, is apt to push out the smoke into the room, overcoming the draught. Besides, fresh air too, often rushes in there, (it being so low down,) and obstructs the smoke. These ventilators would answer remarkably well at the top of the wall, where the light foul air is always lodged. (I think it a question however, whether a ventilator for foul air, should be connected with the chimney, on account of its affecting the draught.) A fire-place often smokes at the kindling—this is because the draught is not formed, which carries up the smoke: this is prevented by using very combustible matter in kindling—such as light-wood, very dry wood, &c. In cabin chimneys the shortness and largeness of the funnel when the vent is too large (equal in fact to the chimney itself,) affects the draught, and smoke—make the vent smaller: this will prevent the wind also from having too powerful effect on the fire. Sometimes one flue and room is filled with the smoke of another flue,—closing the communication between the two will prevent the evil.

The draught is not only affected by the construction of the chimney and fire-place, but by other causes—as the wind, &c. This has called in use the construction of arches over the top of the funnel. When a chimney smokes from the wind blowing down the funnel, where there are two funnels in the same shaft, they must be separated at top by arches. When a chimney smokes from a particular direction of the wind—as N. W. for instance—and is obstructed by any obstacle on the opposite side of the chimney, as higher buildings, trees, &c., a funnel of tin swung over the top of the chimney to move with the wind, will prove a remedy—the wind claps one part of the funnel close to the top of the chimney in that direction in which it blows—this prevents it from going down the chimney, while it turns the funnel (or cap) up in the opposite direction, to open a passage for the smoke. The manner in which groves of trees, higher buildings, hills, &c. affect the draught is, by obstructing and reflecting the winds in various directions.

NICHOLAS E. READ.

Charlotte County.

THE TENNESSEE FARMER.

The publication of a new agricultural paper has lately been commenced in Tennessee, edited by Thomas Emmerson, Esq., of Jonesborough. Though appearing in size and form somewhat suited to its low price of \$1 a year, it exhibits such evidence of editorial ability, as promises a valuable work. There is abundant room for the labors of Mr. Emmerson, and we heartily wish success to his exertions. We may not be altogether disinterested in this wish—for it would operate directly and greatly for the advantage of the Farmers' Register, if our brother editor can convince the tillers of new and fertile lands of the south-west, of their mistake in the opinion so very generally entertained, that they have no need for agricultural journals—a fertile soil alone being deemed sufficient to supply every defect of economical management, and of agricultural information.

The two following editorial articles are from the

second number of the Tennessee Farmer, just received. The first is introductory to the insertion of an article which formerly appeared in our work, ("Another way of fattening hogs.") From these remarks it may be inferred, that the economy of our customary way of raising and keeping hogs, is at least doubtful in a new country like Tennessee, where the disadvantage of the plan must be much less than in Eastern Virginia.

From the Tennessee Farmer.

ON HOGS RANGING AT LARGE.

We invite the attention of our readers, to the article in this number, from that valuable work the Farmers' Register, on the raising and fattening of hogs. It will be found to contain some humorous sarcasms, on the absurd mode adopted in Virginia, and with little alteration, too generally practiced in this country, of rearing this valuable animal—a mode which though adopted for its supposed economy, is in truth, perhaps the most wasteful, the most extravagant, and the most unprofitable ever yet devised. The actual loss annually sustained in Tennessee, from the manner in which hogs are generally reared and fattened is immense; and would, could it be ascertained with precision, astonish those by whom it is resorted to under the erroneous impression, that it is recommended by its economy. We should hazard little by asserting, that by a more humane and judicious mode of rearing hogs, double the quantity of pork could be annually raised from the food now expended in raising the half—and that pork too, of far superior quality. To raise hogs with profit, except in a few situations, possessing peculiar advantages, situations now rarely to be met with, two rules must be observed. First—to feed the sows in such a manner as to enable them to keep the pigs fat until weaned. Secondly, never to suffer them to become poor after they are weaned. By observing these rules, especially with the aid of clover, it will be easy to make a hog at from twelve to eighteen months weigh double, if not thrice as much, as many now do at two and three years old, and with no greater quantity of grain than is now often expended in rearing and fattening the latter. The suggestions of the writer of the article alluded to, are well worthy the attention of all who wish to convert their corn into pork with profit. The absurd selfish notion, that whatever a hog picks up in the woods, or in his neighbors' fields, is so much clear gain to his owner, ought long since to have been banished, by the notorious fact, that many hogs thus raised, after being fattened, will not at a reasonable price, sell for as much as the corn cost, consumed by them. Whereas, one judiciously raised, will sell for double the price of the grain expended in rearing and fattening him. If any one doubts the truth of this assertion we only ask him to make the experiment on two litters of pigs, keeping an accurate account of the food consumed, and of the price of the pork yielded by each, and his doubts will be speedily removed.

To keep stock of any description, in a state of almost constant starvation, is cruel and immoral, and it will, on a fair experiment, be found, that in this instance, as well as in every other, Providence has so connected the duty and interest of man, that he cannot violate the former but at the expense of the latter. Were this great truth well

understood and well considered, it would produce many valuable improvements in agriculture, it would save the innocent and helpless domestic animals from a dreadful mass of suffering, and it would save the earth, from that impoverishment, by which posterity are subjected to oppressive labors and hardships for its renovation, which an enlightened regard to their own true interests, on the part of their ancestors, would have rendered wholly unnecessary. As the rearing of hogs ought probably, in the present state of East Tennessee, to form a prominent item, of her agricultural pursuits, we propose from time to time, presenting to our readers the most valuable articles on the subject, which may be within our reach, and we earnestly request those who may have made any valuable experiments, to furnish us with a detailed account of them, and of their results. Our own experience authorises us confidently to assure our readers, that regular salting is no less beneficial to hogs than to other stock, and that to spread the salt on ashes in the salt trough, is a mode well calculated to preserve the health of the animals.

From the Tennessee Farmer.

ON BURNING GYPSUM.

A subscriber propounds to us the following questions:

1st. Will the burning of plaster answer in lieu of grinding?

2nd. If so, how should the process be conducted?

We should be glad to receive replies to the above inquiries from any of those who have made the experiment. In the mean time we would advise our correspondent to make an experiment on a small scale. We have heard of burnt plaster being used with advantage near Abingdon, Virginia. We once endeavored to make an experiment but found it difficult to burn the plaster on a log heap so as that it would slack. The practice of burning, nay even of kiln drying to facilitate the grinding, is condemned by others as very injurious to the plaster—we should therefore be loth to try it on a large scale.

From the Farmers' Series of the Library of Useful Knowledge.

ON DRAUGHT.

It will be necessary first, to explain and define clearly some terms which will occur frequently in the course of this paper, and especially the word 'draught,' which is the title itself of the treatise.

This word is used in such a very general and vague sense, that it would be difficult, if not impossible, to give an explanation which should apply equally to all its different meanings.

In the expression draught by animal power, it would seem to mean the action itself of drawing, while, on the other hand, it is frequently used to signify the amount of power employed, also the degree of resistance, as when we say the draught of a horse, or the draught of a carriage. Draught power is also an expression used. We shall, however, in the course of this treatise, confine our use of the word to the two meanings—*draught*, the action of dragging—and *draught*, the resistance to the power employed to drag any given weight.

Force of traction is another expression requiring explanation; but here we must enter into more detail, and shall give at once a practical illustration of our meaning.

A force is most conveniently measured by the weight which it would be capable of raising; but it is not therefore necessarily applied vertically, in which direction weight or gravity acts.

If a weight of 100 lbs. be suspended to a rope, it is clearly exerting upon this rope a force of 100 lbs.; but if the rope be passed over a pulley void of friction, and continued horizontally, or in any other direction, and then attached to some fixed point, the weight still acts upon all parts of this rope, and consequently upon the point to which it is fixed, with a force equal to 100 lbs. and so inversely, if a horse be pulling at a rope with a force which if the rope were passed over a pulley, would raise 100 lbs., the force of traction of the horse is in this case 100 lbs. Spring steelyards being now commonly in use, we may be permitted to refer to them as affording another clear exemplification of our meaning. In pulling at a steelyard of this description, whether the force be exerted horizontally or vertically, the index will of course, show the same amount; and, consequently, if the strength of the horse be measured by attaching the traces to one of these steelyards, the number of pounds indicated on the dial will be the exact measure of the strain the horse exerts, and the amount of strain is called his 'force of traction.'

Having fixed as nearly as possible the meaning of these terms, which will frequently occur in the course of our progress, we shall proceed to the division of the subject.

It is evident that there are three distinct agents and points of consideration in the operation of draught, which are quite independent of each other. They are—first, the moving power and the mode of applying it; secondly, the vehicle for conveying the weight to be moved; thirdly, the canal, road, or railway, or what may be generally termed the channel of conveyance.

All these individually influence the amount of draught, and require separate consideration; but the mode of combining these different agents has also a material effect upon the result: consequently, they must be considered in relation to each other; and to obtain the maximum useful effect, with the greatest economy, in the employment of any given power, it is evidently necessary that these different agents should not only each be the best adapted to its purpose, and perfect to the greatest possible degree, but also that they should all be combined to the greatest advantage.

We shall proceed at once, then, to examine the different agents now employed, the modes of applying them, and the proportionate effects produced.

And, first, with regard to the species of moving power;—

This may be of two kinds, animal and mechanical.

By animal power we mean the direct application of the strength of any animal to dragging or pulling, as in the simple case of a horse dragging a cart. By mechanical, the application of any power through the intervention of machinery; the source of power in this latter case may, however,

be animal strength, or a purely mechanical agent, as a steam-engine.

The latter is the only species of mechanical power which it has been attempted to apply practically to locomotion; and therefore that alone we propose to compare with the animal power.

Now, although these two powers, viz., simple animal power and the steam-engine, may in most instances be applied so as to produce the same effect, and may, therefore, to a superficial observer appear similar, yet there do exist such essential differences in the mode of action, or the means by which the effect is produced, that there are many cases in which the one may be used, wherein the other may be totally inapplicable.

In this treatise, draught by animal power is indeed the principal object of consideration; but as, at the present moment, there appears to be a great effort making to supersede animal power entirely by mechanical—to dismiss our old servant, the horse, and supply his place by the steam-engine, it may be as well, in justice to the former, to say a few words in his defence, and to take a rapid and general view of the distinguishing features of the two agents.

To enter into all their respective merits, and to weigh their comparative advantages under all circumstances, would involve us in many questions foreign to our immediate point of consideration, and would embrace subjects which may supply matter for future consideration well worthy of our attention. It is sufficient for our present purpose to show that there still exist great objections to the universal application of machinery to draught, objections which do not equally apply to the use of animal power; and on the other hand, that there are many advantages in the latter, which are not yet obtained by the former; and that animal power continues, for all the ordinary purposes of traffic upon *common roads*, to be the most simple in its application, and certain in its effect.

We shall confine ourselves particularly to the consideration of that part of the question which relates to the slow transport of heavy goods, as being the most important branch of the subject, especially for agricultural purposes. Economy is, of course, the grand desideratum in the consideration of this question; consequently, the comparative expense of the two powers, supposing them for the moment equally convenient and applicable, will first demand our attention.

A difficulty arises here, however, from the want of a certain measure of comparison. The power of a one-horse engine is by no means exactly the same thing as that of a horse. As we have before stated, the mode of applying them being different, the variations in the results are different, and consequently the effects do not bear a constant proportion to each other, under different circumstances; we must therefore be careful not to fall into the mistake which we have ourselves pointed out as a very common source of error, viz., the drawing general conclusions from data obtained in a particular case. We shall take the power of the horse, and that of the steam-engine as ascertained practically on railways, where the effect of each is less influenced by accidental circumstances, and consequently can be better ascertained than on a road. We shall confine our calculations of expense to this particular case, and then endeavor to discover how far the same results are to be ex-

pected, or what modifications are likely to take place, and what alterations are to be made in the results under different circumstances. As regards the first, viz., the comparative cost of animal and mechanical power on a railway, we cannot do better than quote the words of the late Mr. Tredgold upon this subject, and we accordingly extract the following from his work upon railways:—

'The relative expense of different moving powers for railways is an interesting inquiry, and the same materials being necessary to estimate the absolute expense for any time or place, it is desirable to give some particulars, to aid the researches of those who wish to make such comparative estimates. The annual expense of a horse depends on—

- '1. The interest of purchase-money.
- '2. Decrease of value.
- '3. Hazard of loss.
- '4. Value of food.
- '5. Harness, shoeing, and farriery.
- '6. Rent of stabling.
- '7. Expense of attendance.

'According to the average duration of a horse in a state fit for labor, of the description required on a railway, the first three items may be estimated at one-fourth of the purchase-money; the food, harness, shoeing, &c., included in the 4th, 5th, and 6th, will most likely not exceed £40 per annum, nor yet be much short of that amount; and supposing one man to attend to two horses, this would add £15 12s. if the man's wages were 2s. per day; and, at this rate, the labor of a horse of the value of 20£ would cost 60£ 12s. per year; or, since there are 312 working days in the year, the daily expense would be 3s. 10½d., or 186 farthings. But the power of a horse is about 125 lbs. when travelling at the rate of three miles per hour, and the day's work eighteen miles.

'The annual expense of a high-pressure locomotive engine, or steam-carriage, consists of—

- '1. The interest of the first cost.
- '2. Decrease of value.
- '3. Hazard of accidents.
- '4. Value of coals and water.
- '5. Renewals and repairs.
- '6. Expense of attendance.

'It is difficult to procure these particulars from the experience of those who employ engines; we will therefore annex, by way of example, such sums as we think likely to cover the expense.

'The first cost of the engine and its carriage may be stated at 50£ per horse power, and its decrease of value and hazard will render its annual expense about one-fifth of its first cost, or 10£ per annum per horse power. The expense of fuel and water per day will be not less than one bushel and a half of coals per horse power, and fourteen cubic feet of water; and, taking the coals at 6d. per bushel, and the water and loading with fuel at 3d., the annual expense will be 15£ 12s.; the renewals and repairs, at 20 per cent. on the first cost, will be 10£ which is as little as can be expected to cover them. Attendance, suppose one man and one boy for each six-horse engine, at 6s. per day, or 1s. per day for each horse power, or 15£ 12s. per annum; therefore the total annual expense of one-horse power would be 51£ 4s., or 158 farthings per day. This power is equal to a force of traction of 166½ lbs. for the

same number of miles per day as the horse; but from this gross amount of power we must deduct that necessary to move the engine with its supply of coals: this will reduce it at least to 155 lbs., consequently, in the one case we have a force of traction of 125 lbs., at an expense of 186 farthings, and, in the other, a force of 155 lbs. at an expense of 158 farthings; and reducing them both to one standard quantity of work done, we find the expense of the horse is $\frac{11}{12} = 1.488$, and of the locomotive engine 1.019, or about as 147 is to 100. In this case, therefore, there appears to be a decided economy in the use of the steam-engine, and accordingly its application has become very general, and is becoming more so every day.

Let us now examine what alterations are requisite, before we can apply these calculations to the case of draught upon common roads. Supposing both species of power equally convenient and applicable, and confining our observations merely to the amount of power and proportionate expense.

The force of traction of the horse, and the yearly cost, will remain so nearly the same, that for our present purpose we may consider them quite unaltered. Not exactly so with the locomotive engine.

All the parts of the machine must be made much stronger and heavier, and consequently more expensive for road work than for railway, and, therefore, the first cost will be greater—the wear and tear will also be greater, and as the work will be more variable, the consumption of fuel will be increased as well as the price; which, generally speaking, will be much less on a line of railway, than it can possibly be elsewhere.

Still all these circumstances will not influence the result so much as the increased effect of the weight of the engine. On a railway with the carriage, as now constructed, the force of traction is not much more than $\frac{1}{15}$ or $\frac{1}{20}$ of the weight moved; consequently, the power necessary to move the engine itself is not very considerable. On a road, however, this proportion is materially altered; here the average force required to move a well-constructed carriage cannot be estimated in practice, at less, even when the roads are in good repair, than $\frac{1}{10}$; the engine, according to the construction of the best locomotive engines now in use, will weigh, with its carriages and fuel, at least one-half ton, or 1120 lbs. per horse power, and $\frac{1}{10}$ of 1120 is nearly 112 lbs., which we have to deduct from the gross power of the engine, and which leaves only 121½ lbs. as the available power. The proportional expense of the horse and the steam-engine is now therefore about as 115 to 100, and this without taking into account the causes of increased expenditure already alluded to as regards the prime cost, the repairs, and the consumption of fuel. From these calculations it would appear, that even if mechanical power was found as convenient and applicable in practice as horse power, still no great economy can be expected from the employment, upon common roads, of small locomotive engines, such as the best of those now in use, and known to the public, unless it be in cases where other means may fail to produce some particular effect which may be required; if, for instance, a considerable velocity is necessary, the power of a horse is very nearly exhausted in moving his own body, and then there can be no doubt that a mechanical agent, in which power may always be

exchanged for a proportional velocity, will have some advantages on a very good road which in fact approaches very nearly to a railway. But in every case in which velocity is not a principal object, as in the one now under consideration, and where, consequently, little momentum is acquired, and frequent thought slight obstructions occur, as on an ordinary road, an animal appears to possess decided advantages. He adapts himself admirably to the work, increasing or diminishing his efforts according to the variations of the draught, resting himself, as it were, and acquiring vigor where his utmost strength is not called for, and thus becomes enabled to make exertions far beyond his average strength where any impediment or obstruction is to be overcome. Indeed, he appears rather to increase the average effect of his powers by these alternations of exertion and comparative relaxation; and when it is considered that the draught will, in an ordinary road, frequently vary in the proportion of six or eight to one, and that these changes may succeed each other suddenly, the importance of such an accommodating faculty will be immediately appreciated.

By mechanical power, such as a steam-engine affords, these advantages are not easily obtained. Without great weight or rapid motion no momentum can be acquired; and the carriage itself, not being in rapid motion, and the necessary economy in weight precluding the use of a fly-wheel, any small obstruction will check, and perhaps totally stop the machine. For instance, supposing the carriage to be advancing steadily under the effect of a force of traction of 500 lbs., and that a stone or rut suddenly causes a resistance, which it would require 600 or 800 lbs. to overcome, a case by no means rare even on tolerable roads; if the impetus or momentum of the mass be not sufficient to carry it over this obstruction, the machine must stop until some increased power be given to it.

It is also to be remembered, that what we are accustomed, in practice, to consider as the average power of a horse, is the average excess remaining over and above that necessary to carry his own body; and that in all ordinary cases he is able to maintain and continue nearly the same exertions, although the comparative draught of the carriage be considerably increased. Thus, if the road be slightly muddy or sandy, or newly gravelled, the draught, as we shall see more accurately laid down when we come to the subject of wheeled carriages, will be double and even treble what it is on the same road when freed from dust or dirt; but the average power of the horse remains nearly the same, and, practically speaking, equal under both circumstances; that is to say, that the power necessary to move the weight of the horse's body, which forms no inconsiderable portion of his whole power, is not materially increased by a state of road which will even treble the draught of the carriage; consequently, the excess, or available portion of his power, remains unimpaired, and the full benefit of it, as well as of any increased exertions of the animal, is felt and is applied solely to dragging the load.

Not so with a locomotive steam-engine, because beyond the power necessary to perform the work of dragging the load, an additional power must be provided to move the engine itself. In other words, if an engine of ten-horse power be capable of dragging a certain load, the weight of this engine

forming a portion of the load to be moved, a corresponding portion of the power is unprofitably absorbed in moving it, and the excess, or remaining power, is alone available for useful purposes, and can alone be compared to the animal or horse power. Now, if the draught is augmented, as we have just supposed, by any sand, dirt or roughness of the road, or any other impediment, the force required to move the useless weight (of the engine) is proportionally increased; it may even, as we have stated, be doubled or trebled; and the whole power of the engine remaining the same, the surplus or remaining portion is considerably diminished, and that at the very moment when, as before stated, it produces only one-half or one-third the effect.

Moreover, if at any part of the road a power equal to twenty horses is required, the engine, as regards its construction, must be a twenty horse engine. It is erroneous to suppose that a steam-engine, because it is a high-pressure engine, can therefore, as occasion requires, be worked for any length of time beyond its nominal power, by merely raising the steam. Every part of a machine is calculated and arranged for a certain pressure and corresponding power, and that is a real power of it. It is optional to work at or below that power, but, if below, it will be to a disadvantage, and the bulk and weight of the machine will be as great as if it were always worked to its full extent, and both have to be carried over all those parts of the road where a far less power would be sufficient. The velocity of the carriage might indeed be increased, while travelling on the good and level portion of the road, but these alternations in the speed and power cannot be effected without a considerable degree of complexity, weight, and expense in the machinery, and as we are confining ourselves to the consideration of the case where velocity is not required, and might even be an inconvenience, the excess of power will be wasted.

These objections to the use of mechanical power, in certain cases, are pointed out, not as being insurmountable obstacles to the use of machinery, but as serious difficulties which, in practice, have not yet been overcome. In fact, there is not at present any practical substitute for horse power on common roads, and as far as the public is concerned, nothing has yet been done. We, therefore, must consider them as objections remaining to be overcome; and we are compelled to draw the conclusion, that, at the present moment, animal power (always confining ourselves to the question of the economical transport of heavy goods upon common roads) is superior to any mechanical agent, and that beasts of draught, and particularly the horse, are not only the most ancient but still remain the most advantageous source of power.

Long experience has pointed out various modes of applying animal power; but it is frequently ill directed, owing to the want of an adequate knowledge of the mechanical structure of the animal, and the manner in which he exerts his strength.

In the most powerful steam-engine, if too great a resistance be applied, or, practically speaking, if we attempt to make it do more work than it is calculated for, there is an immediate loss of power, in consequence of the diminution of velocity caused thereby; and if we continue to oppose a still greater resistance, we reach the point at which it is unable to overcome it, and it ceases to produce

any effect. Again, a very small obstacle may be so applied as greatly to impede an engine of considerable power, or even to stop it altogether. The power of an engine is limited, and resistance must always be proportioned to it; and there is a proportion beyond which it is useless to go, and less than which would not absorb the whole force.

An animal is but a beautiful piece of machinery, and although perfect in its construction, and wonderfully accommodating in its movements, it still, like the engine, has a limited power, and has its peculiar modes of action, its strong and its feeble parts; and we must well consider its structure, to be able to apply the resistance in that degree, and in that manner which shall enable it to produce the greatest effect. The consideration of the comparative effects of the exertions of a man and a horse will at once exemplify this, and lead us more clearly to the knowledge of the peculiar qualities or faculties of the horse.

If a horse be made to carry a heavy weight rapidly up a steep ascent, or if a man be employed to drag slowly a heavy carriage along a rough road, the strength of both will be soon exhausted, and little effect produced; but if a man be made to carry a weight up a ladder, and if a horse draw a heavy carriage along a road, they will each produce a considerable effect: yet, in the former case, the horse and the man are as strong as in the latter, but their power is not properly applied, and is consequently wasted.

These different results are easily explained, by considering the mechanical structure of the two bodies, and the mode in which their muscular strength is exerted.

The action of pulling is effected in either case by throwing the body forward beyond the feet, which form the fulcrum, and allowing the weight of the body, in its tendency to descend, to act against the resistance applied horizontally, and drag it forward; as the resistance yields, the feet are carried forward, and the action renewed, or rather continued.

* * * * *

We shall here consider both the quality of the draught and the degree.

And first, it is to be observed, that although the weight of the animal's body is the immediate cause in the action of pulling, yet, as before stated, it is by the action of the muscles in advancing the legs and raising the body, that this cause is constantly renewed, and the effort continued. The manner, and the order of succession in which a horse thus lifts and advances his legs may, of course, influence the movement of his body, and ought therefore to be examined into: accordingly we find that many writers upon draught have touched upon this part of the subject, but they appear to have contented themselves with inventing in their closet the manner in which they conceived a horse must have moved his legs, rather than to have taken the trouble to go out of doors to see what really did take place, and, consequently, many have arrived at erroneous conclusions. The ancient sculptors, who generally studied nature so faithfully, either neglected this point, or otherwise our modern horses, by constant artificial training, have altered their step: for we find in the celebrated frieze, from the Parthenon at Athens, a portion of which, now in England, is more commonly known under the name of the Elgin mar-

bles, the only horses which are represented trotting, have both their legs on the same side of the body raised at once, the other two being firm upon the ground—a position which horses of the present day never assume while trotting.

In the case of these relievos, it is true that there are only four horses, out of more than two hundred, which are in the action of trotting, all the others being represented in a canter or gallop; and only two of these four are entirely in the foreground, and distinct from the other figures. It would not be safe, therefore, to draw too general a conclusion from this example alone; but we have another decided proof of the remark we have made, in the case of the four horses of the church of St. Marc at Venice.

Whether this was then the mode of trotting or not, it is certain that it is never seen to occur in nature in the present day; and indeed it appears quite inconsistent with the necessary balancing of the body, and was, therefore, more probably an error of the artist.

It perhaps may have been found difficult or troublesome to watch the movement of a horse's legs; but a very little practice will enable any body to verify what we are about to state: by keeping near the side of a horse that is walking, it will be easily seen that, immediately after the raising of either of the hind legs from the ground, the fore leg of the corresponding side is also raised, so that the latter leaves the ground just before the former touches it. If the fore legs be then watched, it will be seen that, immediately after the movement of either of these, the hind leg upon the opposite side is put in action, so that the order of succession appears to be in walking, as follows—1st the left hind leg, 2nd the left fore leg, 3rd the right hind leg, and 4th the right fore leg.

If the horse be now examined from a short distance, it will be seen that, when he is walking freely, the successive movements of the legs are at equal intervals of time, and that the muscular force of one limb only is brought into action at the same moment. But if a horse, which is dragging a load with some considerable exertion, be watched, it will be seen that he then acts longer upon his legs, and allows a less interval of time for raising and advancing them; and at the same time, the regularity of the movement is generally destroyed; the limbs on the same side generally being moved more simultaneously, or at nearer intervals of time than those at the opposite corners: thus, the muscular forces of two limbs are always acting together, the movement of the whole body is less continued and uniform than in the former case; but each impulse is more powerful, and a resistance, which would be too great for the muscles of one leg, is overcome by the united exertion of two. We shall point out, hereafter, the necessity of attending to this in the application of his power to draught.

In trotting, the action is of course quicker, and a less resistance will, as might be expected, cause the horse to move his legs at two intervals instead of at four equal intervals of time: indeed, a horse accustomed to go in harness generally acquires the habit of that action. There is this striking difference between trotting and walking: in walking, we have seen that the interval between the movement of the legs on the same side was less than the other interval of time: in trotting, on the

contrary, the legs situated diagonally, or at opposite corners, move almost simultaneously. Owing to the velocity and the momentum which the body acquires in consequence of that velocity, in trotting fast, the successive impulses are less distinctly perceptible, and the movement more continued and uniform than in a slow trot, or in walking.

In galloping, the movement is totally different: the fore legs are thrown forward nearly simultaneously, and the hind legs brought up quickly, and nearly together; it is, in fact, a succession of leaps, by far the greatest interval of time elapsing while the legs are extended after the leap is taken: this is the position, therefore, which catches the eye, and which must be represented in a drawing to produce the effect of a horse in a gallop, although it is the moment when the animal is making no exertion.

The canter is to the gallop very much what the walk is to the trot, though probably a more artificial pace. The exertion is much less, the spring less distant, and the feet come to the ground in more regular succession: it is a pace of ease, quite inconsistent with any exertion of draught.

The consequence of these peculiar movements in the limbs of the animal is, that a succession of impulses is conveyed to the body; and when the movement is slow, and the body of the horse does not acquire any considerable impetus or momentum, the resistance should be *such as to receive each of these impulses, and leave the horse unrestrained in the intervals.*

It must, therefore, be a rigid resistance, void of elasticity.

It must not, however, be a constant, unremitted resistance.

For it is a well known fact, that, however powerful may be the muscles of a limb, they must not be kept constantly on the stretch. Thus we feel even more fatigue by standing than by walking, because one particular set of muscles is then kept constantly exerted. It is evident, therefore, that the resistance or draught must not be perfectly constant but should afford frequent opportunities of relaxing the efforts. Neither must it be a yielding resistance, as in that case the animal could not make any great exertion; for if he applied too much power, he would be liable to fall forward, and should he at any time fall short of the necessary exertion, he would be drawn back by the strain, and it would require a considerable effort to restore the motion.

If a horse be made to drag a rope passing over a pulley and descending into a well with a certain weight, say of 200 lbs. attached to it, it is obvious that he could not make an effort greater than 200 lbs. without instantly considerably increasing his velocity, which would be a waste of power; nor must he for an instant relax his efforts, or fall below that mark, for he would then be unable even to resist the pull, and would be overcome by the weight. Such an extreme case as this, of course, is not likely to occur often in practice, but the disadvantage of the principle is obvious.

An arrangement of this sort is, indeed, sometimes made use of, for raising the earth from excavations, or the materials of a building; but the exertion is continued only for a few seconds, or for a distance of not more than ten or twenty yards: if prolonged, the inconvenience would be seriously felt, as it is, to a certain degree, in towing canal

boats; the length and curve of the rope give an elasticity to the strain, and the necessity of keeping the rope out of the water, or from dragging along the towing-path, compels the animal to keep up a constant, unremitted pull, and that, too, in an oblique direction, so as to throw him into an unfavorable position. We accordingly find that, under these circumstances, the average work of a horse is equivalent only to about four-fifths of that given by Smeaton, Desaguliers, and others, who estimated the power of the horse from the work done in a horse-mill, where the resistance is inelastic, and all circumstances favorable, with the exception of the circular path.

The disadvantage of this kind of resistance is well known, to carmen, though of course without consideration of the reason. A horse is said to pull better when he is close to his work, that is to say, when he is attached at once to the body to be moved, because every exertion he makes is then communicated at once to the mass; but the leader of a team, unless he keeps the traces constantly on the stretch, may frequently waste a powerful effort without producing much effect upon the carriage.

Another inconvenience resulting from harnessing horses in a team, or one before the other, is, that the leader, by tightening the traces, is continually relieving the strain from the body horse, and reciprocally the body horse from the leader; so that these horses labor under all the disadvantages of a long, elastic, and constantly yielding connexion with the load, which is not only fatiguing to them, but, in cases where the resistance is variable, prevents the full and united effect of their exertions being properly communicated to the carriage. For, if a slight obstacle, as a rut or stone in a road, checks the progress of the vehicle, the shaft-horse can immediately throw his whole weight into the collar, and the united effect of his strength and impetus is conveyed unimpaired to the vehicle, and forces it over the obstacle; but if any elasticity is interposed between the power and the resistance, as in the case of the traces of the leader of a team, the whole, or the greater part of the effect of impetus is lost, and that force, which, if concentrated in one effort, would effect the object, being lengthened into a continued and comparatively feeble pull, is insufficient.

If we wish to destroy the impetus of a body moving with violence, we receive it with a yielding resistance; the action of catching a cricket-ball exemplifies this perfectly; and therefore, if the full effect of momentum is wanted, all elasticity in the direction of the movement should be avoided.

We have entered rather fully into the consideration of this particular point, because the principle is not only applicable to the mode of communicating the immediate action of the moving power, but will be found also of considerable importance when we arrive at the subject of wheel-carriages.

A consideration of these various points brings us to this conclusion, that the draught ought neither to be constantly uniform or without remission, nor yet yielding or elastic: sudden shocks or violent changes in the velocity must also evidently be disadvantageous, as tending to distress and injure the animal.

Having determined upon the necessary quality

of the resistance, we will proceed to examine into the quantity or the degree of resistance or draught, and the speed best adapted to the exertion of the animal. The useful effect of a horse, or the work done, must evidently depend upon three things, viz. the rate at which he is made to travel, the power of traction he can exert, and the number of hours he can continue to work daily at that speed; and where there is no fixed condition which determines any one of these, such as a particular load to be moved, or a certain velocity which it is desirable to attain, or a limited time to perform the work in, then the object must be to search for those proportions of the three by which, at the end of the day, the greatest quantity of work shall have been produced.

With respect to the first two, viz., the speed and power exerted, it will be obvious, that where a horse travels unloaded, the greatest distance he can go in any given time for several days in succession without injurious fatigue, is the limit of his velocity: on the other hand, the load may be so great, that he can scarcely put it in motion—this is the limit of his power: in both cases, the useful effect is nothing. But between these limits of velocity and power, there is a proportion which affords the maximum quantity of effect, and which, therefore, must be the most advantageous for the application of horse-power.

It has been asserted by theorists, and the theory appears to be supported by experience, that the velocity corresponding to this maximum, or that at which a horse working continually a certain number of hours per day will do the most work, is equal to half the extreme or limit of velocity of the same horse working the same number of hours unloaded; and that the force of traction corresponding to this speed, is equal to half the limit of his power. For instance, if six hours be the length of a day's work decided upon, and if a horse working that time can go six miles per hour unloaded, and therefore producing no useful effect, and supposing the limit of power of the same horse be equal to 250 lbs., it is found that he will do the most work in the same number of hours when drawing a load at the rate of half six, or three miles per hour; and half of 250 or 125 lbs. will be the strain corresponding to this speed. Our next step, then, must be to find these limits: now, the limit of velocity depends upon the length of time during which the speed is kept up; we subjoin therefore a table deduced from experiments, and which represents the proportion of the duration of labor and maximum velocity of the average of horses accustomed to their respective velocities.

		Hours.										
Duration of labor	Maximum velocity unloaded in miles per hour	1	2	3	4	5	6	7	8	10		
		14½	10½	8½	7½	6½	6	5½	5½	4½		

This within the range here given may be considered as very nearly the law of decrease of speed by increased duration of labor; and at the first glance we see the great advantage of reducing the speed and prolonging the exertion. There are, however, many causes to limit the duration of a day's work of a horse. Tredgold, in his work on railways, before quoted, says: 'the time assigned

for the day's work of a horse is usually eight hours; but it is certain, from experience, that some advantage is gained by shortening the hours of labor; and we have observed, that a horse is least injured by his labor, where his day's work is performed in about six hours; where the same quantity of labor is performed in less than six hours, the over-exertion in time shows itself in stiffened joints, while the wearying effects of long-continued action become apparent, if the duration of the day's work be prolonged much beyond eight hours. Indeed, under the management of a good driver, a full day's work may be completed in the time before mentioned—six hours—with benefit to the health and vigor of the animal.

We may be permitted, however, to abandon the idea of improving the health of the animal, or of rendering his business a pleasure to him—an attempt, the success of which is, we should think, very questionable, and content ourselves with endeavoring to check the barbarous practice of working horses to death either by overdriving or overloading them; and we shall, as is generally the case, consult our own interests and follow the dictates of humanity at the same time, by not injuring so useful an animal: and we think experience proves there will be no danger of doing this by working eight or nine hours a day. By referring to the table above, we see that the maximum velocity of the average of horses corresponding to eight hours' work is five miles and a half per hour, consequently, the rate at which he would travel when loaded is a little more than two miles and a half per hour. There is no doubt that some horses could conveniently travel faster; but as the speed must generally be governed by that of other horses, the average is, in this case, the rate to be adopted. The force exerted under these circumstances depending upon the quality of the horse, it is very difficult to obtain even an approximate value of it, unless the experiment be made upon each individual horse: it is fortunately, however, of no great consequence in practice, because if we feel sure that we are employing all the power we can command to the greatest advantage, it is not of any very great importance that we should know the exact amount of that power.

In comparing animal horse power with that of the steam-engine, we estimated it at about 125 lbs., but we believe that, with tolerably good horses, it may generally be taken at more than that.

We have thus far confined our attention to the cases where velocity, as well as duration of labor, was left to choice; this is far from being always the case. In stage-coaches, or other conveyance for passengers, speed is absolutely necessary, and it only remains to learn how that speed can be obtained with the greatest economy. The following table, extracted from Tredgold, will show the great reduction in the effect produced by increasing the velocity.

The first column being the velocity or rate per hour, continued for six hours per day; the second represents the force of traction of which the animal is capable; and the third, the comparative effects produced. A force of traction of 125 lbs. continued for six hours at the rate of three miles per hour being taken at the standard, and considered equal to the arbitrary number 1000.

Miles per hour.	Force of traction in lbs.	Effect produced.
2	166	888
3	125	1000
3½	104	972
4	83	088
4½	62½	750
5	41½	555
5½	36½	500

If, however, the hours of labor be lessened, taking the velocity corresponding to the greatest useful effect, the results will be much greater, and the velocity may be raised much higher, as will be seen in the following table.

Here the first column is the length of day's work, the second the best velocity corresponding to that time, or half the limit of velocity shown in table (1,) and the third column the comparative effect produced, the force of traction being in each case 125 lbs.

Duration of labor in hours.	Velocity, miles per hour.	Effect produced.
2	5½	578
3	4½	709
4	3¾	813
5	3¼	909
6	3	1000
7	2¾	1063
8	2½	1110

To attain higher velocity, it is necessary still further to reduce the load, and the next table is calculated upon the supposition of the strain being only one-half the last, viz., 62½ lbs.; this is about the average exertion of each horse in a four-horse heavy stage-coach.

Duration of labor, hours per day.	Velocity.	Effect produced.
4	5½	613
3	6½	534
2	7½	434
1	11	307

In mails or light coaches, where ten, eleven, and even eleven and a half or twelve miles an hour is attained, the average strain of each horse is barely 40 lbs., and the effect produced, or value of work done, not much more than one-half the above.

It must be remembered, that these tables are all calculated upon the supposition of the road being good, and the work such as not to cause any immediate injury to the animal, and is adapted only to the average quality of horses. They are not therefore at once applicable as data for calculations in all ordinary cases, but only serve to show the comparative forces which may be exerted under different degrees of speed. The results or effects of this force will always be influenced by the quality of the resistance as we have already observed in the cases of slow travelling, but in rapid travelling the power is much more expensive, owing to the great loss which we see by the tables is sustained by increased velocity; and it is, therefore, the more important to study well the means of applying the power in question.

In this rapid travelling, the bad consequences of a uniform and constant strain is still more felt by the horses, and the necessity of occasional relief is still more urgent than at low velocities. It is uni-

versally admitted by horse proprietors and post-masters, whose interests make them peculiarly sensible on this point, that a flat piece of road is more destructive of horses than the same length of road where gentle rises and alternate flat and swelling ground occur; and that a long hill is easier surmounted where there are occasional short levels, and even descents, than when the whole is one uniform ascent.

ANOTHER REMARKABLE BORED WELL IN FRANCE.

From Waldie's Journal of Belles Lettres.

Artesian wells have been very successfully constructed in some parts of France. A letter from M. Jaubert de Passa to Viscount Hericart de Thury, describes a bored well, remarkable for the abundance of water which it supplies. It was made by M. Durand, two leagues south-east of Perpignan.

The sound, after penetrating to the depth of eighty feet, through alternate beds of marl and clay, entered a bed of sandy marl, three feet thick, whence issued a jet of water, very clear, but, from the peculiarity of its taste, unfit for drinking. Its temperature was 14 degrees 5 Reaumur, (=65 Fahrenheit,) and it rose from three to four feet above the surface.

A second boring, undertaken at a distance of six feet from the first, gave, at the same depth, a jet of water; but the first jet diminished, and the quantity of water from both, was less than that which first issued from the former. The boring of the latter was then continued to the depth of one hundred and forty-five feet, when the sound began to sink of itself, and when precipitately withdrawn, the water rushed up, to the height of five feet, and astonished all by its abundance and force. No obstacle could restrain it. No direct attempt was made to determine the maximum height to which it might rise, but fifty feet was decreed to be fully within the limits of its ascending force.

At the time the letter was written, several weeks after the first issue of the water, it continued to flow with the same violence, and with rather increased quantity. From the dimensions and velocity of the current, it appeared to supply four hundred and thirty gallons per minute, or two thousand eight hundred and eighty cubic metres per day. A leaden weight of eight pounds, supported by a string, being placed in the tube, was rapidly thrown out by the water.

The water, which, at first, had a peculiar taste, but not disagreeable, is now very limpid and insipid, and its temperature 60 degrees Fahrenheit. The total expense of the well was two hundred and sixty-three francs.

[The foregoing extract is an interesting addition to the statements lately presented in this work of the effects of boring for water. Besides the great volume of water discharged, and its prodigious force of ascension, there are two other facts worthy of notice in this short account. The first is, that the second boring, which was so near the first that it may be considered as merely doubling the size of the aperture, served not only to diminish the force of ascension, but also the volume of water discharged. Another matter deserv-

ing notice is the small expense at which this object was attained, only about \$50. There are not many considerable farms where thrice this sum would not be profitably expended for an overflowing fountain, or well of pure water, though furnishing but a very small supply—and a well like this, in many situations would be worth many thousands of dollars. It is surprising that this discovery is so slow in coming into use. If water may be thus obtained in most localities, no imagination can now fix limits to the future results and value of the discovery. Abundant supplies of pure water will not only be obtained for drinking and household purposes in places now suffering under its deprivation, but possibly in sufficient quantity and force to act as a motive power. In the few attempts made in this country, it is more than probable that the boring never was made to penetrate deep enough to reach the most abundant sources of water. In the tide water region of the southern states there would be found no rock nor any serious impediment to the borer, at least for any depth yet known—and therefore, no where could such experiments be made at less cost, nor with more useful results, if successful. It is highly desirable that the government should encounter the expense of such an experiment, by causing a boring to be made to the greatest possible depth.

The subjoined letter was an answer to our written inquiries made of an old friend. Though not designed for publication, there is no other reason why its contents should be kept private—and we hope that our friendly and intimate relations will serve with him as a sufficient excuse for taking this liberty—which is one that we have rarely used—and certainly never mean to publish any letter, if it can be supposed that the writer would have objected.]

THE BORED WELLS OF ALABAMA.

To the Editor of the Farmers' Register.

Marengo County, Alabama, Dec. 20, 1834.

Your letter making inquiries about the bored wells, or fountains, and the prairie lands &c. of this section of country was received a few days since, and as I feel better to day than for several past, (although I now write in bed,) I will now endeavor to give you all the information I have on the subject. When I arrived in this country in January 1832, I do not think I heard of a single instance where success had attended the efforts in getting water in this way, although many had attempted it. But an ingenious blacksmith (a Yankee,) turned his attention to the business, and his exertions were soon crowned with success. He says his success had been mainly owing to his having a hole in the lower end of his shaft, or rather the first shaft that is attached to the auger, the hole communicating with the auger itself, and is made by gun barrels being screwed one on the other. This hole, he says, prevents too much suction when the auger gets a very great depth into the rock. He and his company have succeeded in raising the water above the surface in this county, and in Greene, and in some instances it rises more than six feet above the surface. The quantity I am told varies almost in every instance, according to the depth of the lime-stone rock

—the deeper that is, the less the quantity and the warmer the water, but it is easily cooled by digging a cistern close to the bored well into the lime-stone rock—which soon makes the water as cool as the best springs in Virginia. The quantity I am told varies from the same cause, from 500 to 2000 gallons in twenty-four hours. I have heard of no instance in which complaint is made of there not being water enough for all plantation purposes. The bored wells cost from \$250 to \$500, and even \$600. I have only heard of two instances in which this man failed to get the water over the top of the surface, and they are both very close to me. In one of them, which is 560 feet deep, he states there was a split in the rock sixteen feet from the surface and the water would rise no higher. But by digging a common well a few feet from the bored one, and inserting a tube from one to the other, he succeeded in getting into the dug well a plenty of water: but it does not run over—yet there is plenty of water, and the gentleman who employed him paid the full amount. In the other case, he bored 625 feet, and said he had to prepare other fixtures, &c. before he could go deeper. In this well water rose to within fifteen feet of the top: but for this he will not be paid, until he gets the water to flow out—which he says he will yet do. His fixtures, augers, &c. are ingenious, but simple.

They have invariably to bore through the soft lime-stone rock before the water rises, and into free-stone, coarse sand, and sometimes through several strata of flint-rock, before enough flows up: but generally, after the sand is well cleaned out, enough comes up to satisfy the owner, and they give up the job as finished. No seasons seem to have any effect upon the quantity—and the water is invariably "free-stone," and transparent as crystal. But it seems that where the well is close to the river there is a saline taste. This I have heard of in two instances at least—and they are the only ones that I have heard of being bored close to it—for near the river the land is sandy, and they generally have springs. It appears also there is no calculating from experience what the depth of the well will be before it is bored, as they often vary very much in a short distance. It only seems certain that they are deeper near Demopolis, in this county, than any that have been bored in Greene county. It is the opinion of the borer that I have mentioned, (and I can assure you he is a *smart fellow*) and it is also mine, that the free-stone, sand and rock where the water flows from, was the bottom of the ocean when the marine deposits, the shells, and other matters that now form the lime-stone rock were made upon it: but this you know must be conjecture.

I must inform you that the prairies in Greene county are much larger than in this immediate neighborhood, where the immense rich cane lands abound—and they lie from fifteen to twenty miles higher up the river; there, I understand, the wells are not so deep by several hundred feet as here.

The diameter of the auger that the man whom I have spoken of uses, is about three inches—and it is my opinion no more water would rise by using a larger one: but this is only opinion. In boring, they often encounter sulphur balls, which are so hard as to almost resist any tool they can make: and in one instance, (that of the deep well I have

mentioned,) the man informed me, he encountered and went through a stratum of hard load-stone. I must inform you also, that this tract of rich lime-stone land is but of small dimensions—not, I am sure, in one way more than from fifty to sixty miles, and the other, twenty or thirty; and even in that, there are spots of sandy land that have fine springs on them, which are always of free-stone water, or most generally so. Even in the strong lime-stone lands near the creeks, where the land is broken, there are some good springs.

GYPSUM REDUCED TO POWDER BY POUNDING OR BURNING.

To the Editor of the *Farmers' Register*.

Brookfield, (Henrico,) 10th Feb., 1835.

On the farm which I superintend, it is in contemplation to use a large portion of gypsum, both on the ensuing crop of corn and grasses; not having a machine for breaking it, we are under the necessity of performing this operation with mallets or wooden pestles shod with iron, which renders it both tedious and laborious. By heating gypsum to a red heat, its watery portion is dissipated, and it readily falls into a powder. I should be glad to know from yourself, or any of your numerous readers, whether gypsum, to be applied as a manure, and heated to an extent sufficient to dispel the water which it contains, would lose any of its good qualities as a manure? If none of its good qualities would be lost by being thus heated, it would be an immense saving of labor to reduce it to a powder by this means, over the mode just alluded to.

That sulphate of lime or gypsum is a valuable manure, is generally admitted, particularly on clover and grasses, and I think, also on corn, as by examination, it will be found to exist in the stalk, and to a large extent, in the cob of corn. In cases where it has been applied without any apparent benefit, the probability is, that there was a sufficient portion of it already existing in the soil, it being contained in the dung of all animals fed on grass, and consequently, furnished by the manure in the common course of cultivation. The difficulty, in ordinary cases, of getting it reduced to a powder, deters many from availing themselves of the important benefits usually resulting from its use.

A. N.

[The remarks made previously at page 603, in regard to the effect of heat on gypsum will serve in part to answer the inquiry presented in the foregoing letter, since received. A red heat will not affect the chemical union of the sulphuric acid and lime, and will serve only to drive off the water, which forms the third component part of gypsum. A much lower degree of heat will dispel the water either partially or totally, and so far affect the texture of the stone as to render its pulverization comparatively easy. It is a very important question, which could soon be solved by careful experiments, whether burning lessens the fertilizing power of this substance—important, not only to save labor, if it is not thus injured, but to avoid being cheated by gypsum being burnt by salesmen, if that mode of reducing it is indeed injurious. We again request

attention to this question, and from chemists, as well as from practical farmers.

In the remarks just referred to, we stated from memory only, that gypsum was soluble in about 600 times its quantity of water. Davy and Cleaveland, both state the quantity to be 500, and Thomson, 460 times the quantity of gypsum dissolved—cold water being always understood.

A statement of the component parts may be new and useful to many readers. Sulphate of lime, or gypsum in a perfectly pure state, consists of the following proportions:

	Sul. acid.	Lime.	Water.	Parts of Gypsum.
According to				
Davy, - - -	75	55	34	make 164
Thomson, - - -	100	72.41	55.8	228.21
Bergman, (quoted by Cleaveland,)	46	32	22	100

According to all of these authorities, it will be seen that the lime is less than one-third of the whole quantity of gypsum, and considerably less than the amount of sulphuric acid with which it is combined.

As presented by nature, the purest gypsum is seldom free from some small contaminations of carbonate of lime, alumine, silice, and oxide of iron—and these substances enter more largely into all the gypsum commonly used as manure—though not to so great an extent as to have any considerable effect in lessening its strength—or affecting the value of the stone, unless by rendering it more difficult to be pulverized. The foreign substances in the gypsum of commerce, (the carbonate of lime especially) often serve to render it a better cement after calcination—as a proportion of quicklime is necessary for this purpose.

The last No. (for October 1834,) of the *Annales de l'Agriculture Française*, which has been received since the foregoing remarks were in type, contains a passage which shows that the effect of burning gypsum to reduce it for manure, has engaged attention in France—where however, the manure operates much less powerfully than in the United States. One of the premiums offered by the *Société royale et centrale d'agriculture du département de la Seine-Inferieure*, for the year 1836, is the following:

"To determine the best method, and the time most favorable for plastering clovers and plants for forage, and under what circumstances the preference ought to be given to plaster burnt, or plaster not burnt. The prize will consist of a medal of gold, of the value of 150 francs."

[It is altogether unknown to us who is the author of the following concise review—but he is evidently one whose modes of thinking and of investigation are such, that his approbation must be highly prized where bestowed, and his strictures allowed their full and proper weight. It is not only for these reasons that the article is here republished, but because the reviewer has directed his readers' attention particularly to some of the novel positions in the *Essay*, which, if true, certainly are of high importance, and which if unfounded, may be, and ought to be, overthrown.]

From the Genesee Farmer.

"ESSAY ON CALCAREOUS MANURES."

This is the title of a duodecimo volume of 242 pages, published more than two years ago, by Edmund Ruffin, editor of the *Farmers' Register* in Virginia. It is more particularly designed for the Tertiary Formation of the maritime states; but we have no hesitation in saying that it ought to be read by every farmer who wishes to understand the nature of manures, and to know how to apply them to the best advantage. It is an original work of great merit. The author is not a mere theorist, proposing plans for others to follow; but a practical farmer who has thoroughly inquired into the causes of the sterility that has long overspread the tide-water districts; and who has led the way in a course of improvements which must materially change the condition of that country.

His chemical experiments on various soils have produced some very unexpected and surprising results. For instance: he finds a total absence of calcareous earth in all *their* poor soils, and also in many rich soils: and it is particularly worthy of notice that some of these specimens were obtained in the near vicinity of limestone rocks. Our author says, "before the first of these trials was made, I supposed (as probably most other persons do) that limestone soil was necessarily calcareous,* and in a high degree." His experiments have shown however, that this is a mistaken notion. One sample was taken from a piece of land so rocky with limestone as to be unfit for the plough, and yet one thousand grains of the soil yielded only one grain of calcareous earth. Various other specimens have shown a total destitution. Brown loam from the Sweet Spring Valley, remarkable for its extraordinary productiveness and durability, which must have been often covered and saturated with mineral waters holding lime in solution—yielded not a particle of calcareous earth. The same result was obtained from various soils, some lying on the surface of limestone; others taken from between masses of that rock; and our author after detailing the particulars, remarks: "thus it appears that of *nineteen* specimens of soils, only *four* contained calcareous earth, and *three* of these in *exceedingly small* proportions. It should be remarked that all these were selected from situations which from their proximity to calcareous rock, or exposure to calcareous waters, were supposed most likely to present highly calcareous soils. If five hundred specimens had been taken without choice, from what are commonly called limestone soils, the analysis of that whole number would be less likely to show calcareous earth, than the foregoing short list."

We confess these results were new to us; and our curiosity was excited to ascertain if the rich limestone lands of the Genesee country were in the same condition. On selecting specimens from an old field, at the different depths of *four* and *seven* inches, which we should not hesitate to call

* The term "calcareous" should be limited and restricted to carbonate of lime, lexicographers to the contrary notwithstanding. We are supported on this point by mineralogists who know the importance of precision in language, and who use the terms *calcareous alabaster* and *gypseous alabaster*, although the base of each mineral is *lime*.—GEN. FAR.

a limestone soil, to our surprise, these specimens when treated with muriatic acid, gave no indication of calcareous earth; and on procuring others from a dark rich loam amongst broken limestone partly disintegrated, the effervescence was but barely visible. On digging down into the subsoil however, and subjecting a specimen to the same treatment, the carbonic acid foamed in the glass. We are therefore prepared to adopt the conclusion of our author, that calcareous matter when mixed with the soil, soon becomes converted into the oxalate of lime* and the unchanged state of *that* subsoil, from not having been penetrated by the vegetable acids, may be offered as additional evidence.

He has not left this opinion however, unsupported by direct experiments. To an acid soil, full of vegetable matter, he applied fossil shells at such a known and heavy rate as would have given to the soil (by calculation) at least three per cent. of calcareous earth to the depth of five inches. After the field had been cultivated six years, the soil was examined; and in the first experiment 1000 grains only yielded eight of calcareous matter; the second experiment only seven grains; and in the third, 1500 grains produced seventeen and a half. The average is thus considerably less than one per cent.; and shows that more than two per cent. of calcareous matter had undergone a new combination.

As a sample of our author's manner of treating a subject, we select a "Note" in the appendix on the application of gypsum. In the lower parts of Pennsylvania, *liming* has been found to insure the efficacy of that wonderful manure; and some of our readers may recollect that our correspondent J. Spicer (Vol. 2, p. 165,) has derived great benefit from mixing *ashes* with it before sowing. How these operate, we think the "Note" (which follows) will satisfactorily explain.

"I do not pretend to explain the mode of operation by which gypsum produces its almost magic benefits: it would be equally hopeless and ridiculous for one having so little knowledge of the successful practice, to attempt an explanation, in which so many good chemists, and agriculturists both scientific and practical, have completely failed. There is no operation of nature heretofore less understood, or of which the cause, or agent, seems so totally disproportioned to the effect, as the enormous increase of vegetable growth from a very small quantity of gypsum, in circumstances favorable to its action. All other known manures, whatever may be the nature of their action, require to be applied in quantities, very far exceeding any bulk of crop expected from their use. But one bushel of gypsum, spread over an acre of land fit for its action, may add more than twenty times its own weight to a single crop of clover.

"However wonderful and inscrutable the fertilizing power of this manure may be, and admitting its cause as yet to be hidden, and entirely beyond

our reach—still it is possible to show reasons why gypsum cannot act on many situations, where all experience has proved it to be worthless. If this only can be satisfactorily explained, it will remove much of the uncertainty as to the effects to be expected: and the farmer may thence learn on what soils he may hope for benefit from this manure—on what it will certainly be thrown away—and by what means the circumstances adverse to its action may be removed, and its efficacy thereby secured. This is the explanation that I shall attempt.

"If the vegetable acid, which I suppose to exist in what I have called acid soils, is not the oxalic, (which is the particular acid in sorrel,) at least every vegetable acid, being composed of different proportions of the same elements, may easily change to any other, and all to the oxalic acid. This, of all bodies known by chemists, has the strongest attraction for lime, and will take it from any other acid which was before combined with it—and for that purpose, the oxalic acid will let go any other earth or metal, which it had before held in combination. Let us then observe what would be the effect of the known chemical action of these substances, on their meeting in soils. If oxalic acid was produced in any soil, its immediate effect would be to unite with its proper proportion of lime, if enough was in the soil in any combination whatever. If the lime was in such small quantity as to leave an excess of oxalic acid, that excess would seize on the other substances in the soil, in the order of their mutual attractive force; and one or more of such substances are always present, as magnesia, or more certainly, iron and alumina. The soil then would not only contain some proportion of the *oxalate of lime*, but also the *oxalate* of either one or more of the other substances named. Let us suppose gypsum to be applied to this soil. This substance, (sulphate of lime) is composed of sulphuric acid and lime. It is applied in a finely pulverized state, and in quantities from half a bushel to two bushels the acre—generally not more than one bushel. As soon as the earth is made wet enough for any chemical decomposition to take place, the oxalic acid must let go its *base* of iron, or alumina, and seize upon and combine with the lime that formed an ingredient of the gypsum. The sulphuric acid left free, will combine with the iron, or the alumina of the soil, forming *copperas* in the one case, and *alum* in the other. *The gypsum no longer exists*—and surely no more satisfactory reason can be given why no effect from it should follow. The decomposition of the gypsum has served to form two or perhaps three other substances. One of them, *oxalate of lime*, I suppose to be highly valuable as manure: but the very small quantity that could be formed out of one or even two bushels of gypsum, could have no more visible effect on a whole acre, than that small quantity of calcareous earth, or farm-yard manure. The other substance certainly formed, *copperas*, is known to be a poison to soil and to plants—and *alum*, of which the formation would be doubtful, I believe is also hurtful. In such small quantities, however, the poison would be as little perceptible as the manure—and no apparent effect whatever could follow such an application of gypsum to an acid soil. So small a proportion of oxalic acid, or any *oxalate* other than of lime, would suffice to decompose and destroy the gypsum, that it would

* This accords with the assertion of the Earl of Dundonald in his *Connexion of Agriculture and Chemistry*: "Much of the oxalate of lime will be formed by adding calcareous matter to ground abounding with plants of sorrel or other vegetables containing the sorrel line or oxalic acid." He has referred to no experiments however, in proof of this opinion. GEN. FAR.

not amount to one part in twenty thousand of the soil.

"Why gypsum sometimes acts as a manure on acid soils, when applied in large quantities for the space, is equally well explained by the same theory. If a handful, or even a spoonful of gypsum is put on a space of six inches square, it would so much exceed in proportion all the oxalic acid that could speedily come in contact with it, that all would not be decomposed—and the part that continued to be gypsum, would show its peculiar powers perhaps long enough to improve one crop. But as tillage scattered these little collections more equally over the whole space—or even as repeated soaking rains allowed the extension of the attractive powers—applications like these would also be destroyed, after a very short-lived and limited action.

"Soils that are naturally calcareous, cannot contain oxalic acid combined with any other base than lime. Hence, gypsum applied there, continues to be gypsum—and exerts its great fertilizing power as in the counties of Loudoun and Frederick. But even on those most suitable soils, this manure is said not to be certain and uniform in its effects—and of course more certain results are not to be looked for with us. I have not undertaken to explain its occasional failures any more than its general success, on the lands where it is profitably used—but only why it cannot act at all, on lands of a different kind.

"The same chemical action being supposed, explains why the power of profiting by gypsum should be awakened on acid soils after making them calcareous—and why that manure should seldom fail, when applied mixed with very large quantities of calcareous earth."

For the Farmers' Register.

A NEW MODE OF CULTIVATING CORN MIXED WITH OTHER CROPS.

For several years I have practised a plan of sowing my corn crop, in the execution of which, I consider myself much benefited, viz. in diminishing the labor usually bestowed in preserving that important crop, securing a large mass of excellent forage that would otherwise be lost, and providing the means of making a mass of valuable manure, ("Arator's" gold dust, and I find by experience, mine also)—and as you invite communications on agricultural operations, I will give you the detail. In addition, by my mode of cultivating my land, I find that my grain is much superior to my neighbors, who follow the old beaten tract, "the good old way."

Previous to commencing the pursuit of agriculture, I took a course which common sense would dictate in all human pursuits: I read all I could on the subject—reflected much—and observed the practice of practical men, and especially endeavoring to obtain from them the *why* and *wherefore* of all their operations. I pursued the cultivation of the earth because I delighted in it—and consequently I rarely "called on my man Tom," but became the "man Tom" myself, and directed and superintended all the operations of my farm—and among other notions I took up, there was this one, that the man appeared to me ridiculously inconsistent who would follow one pursuit, and try to excel in another: and in addition, such is my natural

and acquired disposition, that if I had determined to follow picking up old rags, I would try to excel in it. I had but little business at the store, less at the tavern or grog shop—and at elections I went merely to give my vote. My farm was and is the place that "gives me plenty to do," and to it I gave my time—my bodily and mental exertions principally.

At an early day I adopted as an axiom, that labor wisely directed, would endeavor to secure the best possible return from the earth, for that bestowed on it, and that any mode of cultivating the soil which eventuated in its depreciation, was, and should be with me, inadmissible; and if I could not succeed in a mode of cultivation that would yield me *money-making* crops, and permit my land to be advancing in fertility, I would abandon the pursuit. Fortunately for me, a little arithmetical adding and subtracting, made it perfectly evident, that however extravagant the interest I might be getting for the use of capital, yet if that capital was annually depreciating, it was a wretched business.

After forming this opinion, I need hardly add that it was determined by every means in my power, to get into a most efficient manuring system, combining every possible economy and convenience. I bought some good cattle, sheep, hogs, and goats, and found that by a judicious management of them they became a source of profit, and above all, they secured to me the basis of an accumulation of manure. Adopting also a rotation system, I found it added prodigiously to my means for the improvement of my land, and stock, and manure. To preserve in the best manner, every thing that had the semblance of what is called "ruffage," (or offal matters of the farm) consequently became a *desideratum*, and here I put into full operation what is usually termed *economy*.

You could just as soon have found a large full ear of corn lying on the ground around my barn or stable, as a shuck, and equally would you be puzzled to find a corn stalk in my field. "Save all," was my motto. Following up this theory, I soon had large heaps of manure, and had the pleasure of realizing my productive system of husbandry. To arrive at that part of my theory, viz: that the mode of cultivating any given quantity of land that secured to the cultivator the greatest return for the labor bestowed, that the same quantity of land could be made to yield, was the one that sound wisdom would pursue—and certainly the one most profitable. I soon found that a correct system of mixed crops must be resorted to—and to make this mixture judiciously, was an important item in my agricultural course; and to secure the heavy crops or large returns for the labor bestowed, that I had anticipated, I had previously settled that manure must be given to aid in the production of this mixed cropping, as also to secure another of the two great objects which I kept steadily in view, viz: the improvement of the soil. On every view I took of the subject, I was always brought back to this point, and a complete manuring system presented itself uniformly as the key to all successful agricultural pursuit. In the language of that book which contains so many admirable maxims for the wise direction of human life, I went into a system of making manure "with all my might."

In my rotation cropping system, I manure only

for the corn crops, and for this one with long slightly fermented, or rather decomposed manure, but heavily. If I can get the vegetable substances which principally enter into the composition of my manure heap, well saturated with the liquid produced by the animal excrement, and plenty of it into the soil, well turned under before any evaporation can take place, all with me is well—no after-cultivation of that crop brings it to the surface during that season. Pursuing the same system, I have each year one shift resting, after which year of rest, this field, going through the following course, has to work out my corn crop. During that year nothing goes on this field—it is a positive rest: and from the quantity of vegetable matter which grows on it, and which ultimately goes into the soil, it is also a year of restoration.

My corn field this year, 1834, was ploughed deep in September 1833, and the mass of vegetable matter then found on it well turned under, and rye sown on and harrowed in—the harrow going with the furrow—half a bushel of seed to the acre. The rye gave me a fine bite for my young hogs, and sows with pigs, and calves, and a few milch cows, from the 15th of November to the 15th of February, when every thing was removed from the field. On the first day of April the rye was sufficiently rank, and was well turned in; an honest manuring from my dung-stead having been spread on it previously, and on which also was put a decent coat of swamp mud—and well turned under; which last operation, from the previous management, was not hard to effect.

In spreading the manure at this period, the rank rye was pressed down, and with a well constructed barshare plough, was easily turned under as deep as required. A coat of lime was now given, and which was mixed with the soil by a short wooden tooth harrow—the harrow going with the furrow that turned under the manure, and which prepared the field for being laid off in straight rows, at five feet by three, running the three feet furrows first, just sufficiently deep to mark the ground, and not disturb the manure—the five feet furrow running with those that put under the manure, and as deep made with a half-shovel to receive the seed. In dropping the seed, it was done with care, so as to have the grains as nearly as possible in a row; and with little care after thinning, and permitting only the two best plants out of the three dropped to stand, made the after plough cultivation easy and convenient, the ploughman being enabled, without danger, to run close to the stalk, saving much hoe labor. After the corn was planted, (indeed while planting) a furrow was run in the middle of the rows, into which over one-half of the field rice was dropped thick in the drill, the other half retained for peas to be drilled in the same way. The corn and rice were covered with a small board, attached to a light Scooter plough stock. On the first ploughing of the corn, and which was equally a ploughing of the rice, and the dressing that followed with the hoe, the earth was slightly drawn on the three feet intervals between the hills of corn, on two sweet potato sets, the red or bunch (the latter preferred on account of their having almost no vine) dropped and covered. In the hill of corn, one pindar (pea nut or ground pea) was dropped, and covered also. After drilling the balance of the field, between the rows of corn, in peas, my

planting was now finished. It will now be seen, that I had nearly two and a half feet to plough in, or rather stir the ground in, between the rows of corn and rice, and corn and peas, one way of the field.

To prevent premature alarm to your readers, permit me here to say, that my security for success in all those plantings, was the after mode of managing the corn—and which, I think, completely exhibits the value of this 'mode of cultivating land. Here I will anticipate another difficulty with some, viz. the prodigious trouble and labor I was at, in my manuring for this crop; by assuring them, in time, that this manuring was to serve three more years of heavy crops in my rotation system, and for that purpose was found ample.

The ground was well tended—the potatoes grew sufficiently until the corn was removed; the rice also; the pindars and peas were at home. The ground now easy to plough, or rather stir, (for with me no turning up or over in the hot blazing sun season) from previous management, was stirred with small brisk walking mules, and careful ploughers, before each of whom, a premium for excellence of execution was held up. The hoe hands had the same inducement. The mules were well taken care of, each one and his driver being bound together by the strongest ties of interest—every thing, as well as the ground, was stimulated to struggle for success. In tending, the Scooter was the only plough used.

As soon as the first two or three blades on the corn seemed to invite the hand of economy to save, I went through the field and stripped and brought them home, throwing them in bulk under a large shed, turning twice over, and in a few days packing away, sprinkling with salt while stowing away. About the time that I found the balance of the blades inviting to a pulling, the shuck on the corn assumed a yellow appearance, and the corn itself had become pretty hard, and I now prepared by one *coup de main* to "save all"—and this I effected as follows. Four strong hands cut the stalk at the ground, each taking two rows, and laying down, evenly, as cut, (viz. the butts;) on going through, they hung their knives in the scabbard, each man gathering his two rows, and placing in heaps along the centre row. About as fast as this was effected, a wagon with low wheels, and long coupled, on which was a frame fitted for the purpose, passing along, taking up the corn, and laying it carefully on the butts together each layer, and passed to the barn lot, which was well ploughed up, and where the corn was put in shocks, shoving the butts into the soft ground while stacking, spreading well at the bottom, putting the stalks of about sixteen to twenty hills to the shock—and let stand ten days to cure. These small shocks, or stacks, were tied at the top by a wisp of rye straw. This business, as also the cutting, was not arrested by a moderate rain—if any thing, from experience, the latter preferred.

As soon as the field was thus cleared, I proceeded with the Scooter and hoe, and left it in fine order, giving all a last dressing—after which, all the remaining crops grew off rapidly. My corn was admirable, say fifty-two bushels to the acre. By the removal of the corn, the remaining articles had full and fair play, and as much room as they required, on such land as they were now

found in. It must also be recollected, that about the time the corn was removed, was the usual time for potatoes and rice to grow off, as also the pea crop. The rice was cut in the usual time: it could not have been exceeded—having so much room after the corn was taken off, forty some odd bushels of shell rice were made to the acre. The potato hills universally cracked open—they were superior, and the pindars as usual. The bunch and red potato, produced by this mode of management, remarkably well, filling the ground around the hill, and finding the earth containing so much food for their roots, they spread astonishingly. There appears to be no interference between the pea and potato vines, judging from production, although such near neighbors. Better peas or rice I never made by any other mode of planting. The pea crop I save by pulling up the vines, and curing in the fields, carrying home and putting in rail pens, sprinkling with salt as packing away—a good floor to the pens preserves the salt.

The prodigious advantage I derive from the stalks of corn saved in this way, as also the shuck, will be best understood by a communication in the Baltimore Farmer, to which I beg leave to refer, and which use of those parts of the corn crop amply compensates for a little shrinkage in the grain, if any. The manure heap fully settles the account, as also some fine steers, sold annually in the form of work oxen, a few pair of which I have trained to labor on arriving at the age of two years, and which article of sale I find goes off readily. The mass of offal I have from a twenty acre field, planted and tended in this way, is incredible, in stalks, shucks, fodder, peas, and pea vines, rice straw, and lastly, potato vines—and each, saved in my way, of superior quality. In addition, the advantage to the soil of being so much shaded during the intense summer heat, and the return of the pindar vines, and the rice stubble, and potato vines, if not cut up and carried home and fed away. The potatoes I dig up with a three pronged hoe fork, carry home and feed away to my fattening hogs, who are by this time in a dung-stead of their own, yielding, by being well littered, a rich contribution of the "gold dust." The pindars, and balance of the potato roots, go to the sows with pigs, young hogs, &c.—if a mast year, putting them in at night and out in the morning—if no mast, putting them in all day, and penning on plenty of leaf litter during the night, and which makes them count something in the way of the next crop.

My corn remains ten or twelve days in shock, then stowed away under sheds, in barns, &c. For the after management, I beg leave to refer to the paper before alluded to.

It is on the succeeding crop, that my trouble, as it is called, will show itself, and which you can have if desired, from

AGRICOLA.

Clarke County, Alabama.

COST OF A YEAR'S WORK IN USING WATER-BORNE MARL—SAVING CORN FODDER.

To the Editor of the Farmers' Register.

Charles City County, Feb. 4th, 1835.

I have delayed much longer than I intended, in giving you an estimate of my last year's work in the transportation of marl. The pressure of

business which is usual with me at the commencement of every year, must be my apology.

Our work began on, or about, the 25th of March, and ended on the 24th December, a period of eight months. The labor employed was the same as the preceding year* two men and a boy, with the exception of the first two months, when the assistance of the boy was unavoidably withdrawn. The wages of the men were eight dollars per month, and the boy's three dollars and fifty cents. The quantity of marl transported was seventeen thousand bushels. Our business was necessarily suspended for twenty days in repairing our frail bark, in the month of October. The distance is fifteen miles. I shall not attempt to give any estimate of the expense of hauling from my landing, and scattering the marl, as you have it already at hand, and can easily add it if you think it necessary.

To hire of laborers,	- - -	\$152 50
Food for laborers,	- - -	60
Repairs of vessel,	- - -	40
Interest on first cost and fixtures,		18
		\$270 50
By 17000 bushels of marl }	\$272	272
at 1 $\frac{5}{8}$ cents per bushel, }		
		1 50

Thus showing that the expense of transportation alone falls under one cent and six-tenths per bushel. It seems to me wonderful, that so much preference should be given to oyster shells, by those convenient to water. I have used both, and greatly prefer the marl; first as being the cheapest—and secondly, as yielding a more immediate return for the labor, which is one of the most desirable objects to be attained in all improvement. I am still laboring under great disadvantage in regard to the landing of the marl on my shore. Nearly one-third of each load requires to be shifted to a smaller vessel, to enable the larger one to reach the wharf with the remainder, which still convinces me that the digging and water carriage could be reduced, under more favorable circumstances, to one cent per bushel.

I made an experiment the last fall, the future usefulness of which I hope to see realized. Instead of stripping the corn blades from the stalk as usual, I had the whole plant cut up and cured in the Pennsylvania style. I am so much pleased at the result, that I am inclined to think, I shall not waste a month in every year, as heretofore, in gathering and securing fodder. To enable those who may be willing to try the experiment, I would recommend them to put their meadow lands in herds grass, by way of getting ready. Each hand is supplied with a long knife or blade, (a piece of scythe blade answers well) having a convenient handle, with which he cuts the stalk about eighteen inches or two feet from the ground; thus leaving the heaviest part of the stalk to be chopped down immediately after, and turned in during the seeding of the grain. As soon as the latter operation is over, the corn is husked in the field, and taken to the crib, which should be divided into two or more apartments, after the manner of your corn-pen, as described at page 50,

*See page 567, Vol. I. Farmers' Register.

of Vol. I. So soon as this is over, the stalks are stacked as our tops are usually, and afford fine food for horses and cattle of every description.

I have lately learned from a gentleman of great experience, that one hundred pounds per day is a fair average for a hand's work in pulling fodder. Can this sacrifice of labor be much longer borne on an impoverished soil? I shall hope not.

C. H. MINGE.

[The foregoing letter contains the writer's second year's experience of the cost of transporting marl by water, and may be considered a continuation of a former communication on the same subject, which was published in Vol. I. at page 567, to which the reader is referred for the full grounds of the estimate of expense. According to that estimate, the carting of these 17,000 bushels of marl from the landing to the field, (1000 yards) and spreading would amount to \$110 28—to which add the cost above stated for digging and water carriage \$270 50, and it appears that the total cost was \$380 78, or not quite 2½ cents the bushel. These facts well deserve the attention of all land-holders on navigable water, who have not marl on their own farms.]

SOME ACCOUNT OF THE CALCAREOUS REGION OF ALABAMA.

To the Editor of the Farmers' Register.

Greene County, (Ala.,) Jan. 27th, 1835.

* * * I have had it in contemplation for some time to send you some of the different varieties of prairie soil for analysis: I will do so, if agreeable to your wishes. It is no doubt composed almost entirely of marl, and is a soil *sui generis*. It is formed apparently by the decomposition of marine shells—but the fossil remains of some antediluvian animals of immense size are also found in it. There are some fossil remains in Clarke county of an animal whose vertebrae are said to be as large as a dinner plate, and have been used by the inhabitants as fire-dogs. Almost the whole skeleton, I was informed lately, was still lying on the surface of the earth where the animal perished; but I have been unable as yet to procure any specimens of it. The prairie soil is invariably based on rotten lime-stone rock, which is seldom more than ten feet under the surface, and sometimes is not as many inches. It has been perforated to the depth of seven hundred feet for water, and sometimes without success even at that depth; but it is invariably mixed with shells. It has a regular dip from Erie to the neighborhood of Linden in Marengo, of about twenty-five feet to the mile. Where the rock is perforated, the water frequently runs out above the surface of the earth, and sometimes continues to do so, even as high as twenty feet. The water is not generally pleasant to those unaccustomed to its use, and sometimes is highly impregnated with sulphur. Small balls of the sulphuret of iron are frequently found near the surface and among the rock. Entire strata of shells sometimes alternate with the rock, as may be seen in the rock bluffs on the rivers. Near the surface the rock is entirely free from grit; but the lowest stratum is a very hard sand-stone which the borers have to drill, as an auger will make no impression upon it. When dug up and exposed

to the atmosphere the lime-stone readily decomposes and forms a good soil. If kept, however, for some time under a shelter, it becomes hard, and blocks sawed out when it is soft, are sometimes used to build houses and chimneys. It is unfit for the kiln, and will not burn to lime, except a variety which lies in detached pieces on the surface, and is perforated with many small holes.

The soil of the prairies improves by cultivation, and a small quantity of manure increases the product astonishingly, the effects remaining visible for a long time afterwards. It is not very well adapted to the cultivation of cotton without some vegetable manure, except where it is timbered, as the lime causes the plant to rust, and shed its leaves and bolls before they come to maturity. Any grain will grow well on the open prairie; but it seems peculiarly adapted to the growth of Indian corn, oats, and barley. When wet, the soil is as soft and muddy as a bed of mortar, and the roads become, in many places, entirely impassable. When dry, they are very hard, but never dusty. As might be presumed from the nature of the soil, it requires very little rain to perfect the crops on it. If broken early and deep, Indian corn will mature *without any, and never twists, (from drought,)* even when it has no rain on it from the time of coming up. Rains however, increase the crops very much, as well as on other lands.

The prairie soils are remarkable for health, the lime seeming to correct all noxious effluvia from animal and vegetable remains. The inhabitants enjoy a singular exemption from intermittent and bilious fevers, even when the people on the surrounding sandy soils, particularly on the rivers, suffer severely. The summer and fall months are much the healthiest. There are no springs, properly so called, in the prairies, and the water-courses, (which are fed by seeps,) dry up in the fall: hence the necessity of boring.

The limit of my paper prevents my saying more, and indeed, I only intended making two or three observations when I commenced. If you wish, however, I will send you some of the different varieties of soil, if you will give us the analysis. We might perhaps, better understand the *modus operandi*.

ROBERT W. WITHERS.

[The specimens of the prairie soils, offered by our correspondent will be very acceptable, as will any other specimens from dry prairies remarkable for fertility, or the reverse, in all the western and south-western states. A request for this has already been made in this work, (page 455, No. 7,) and it is sufficient here to refer to the directions there given for selecting and transmitting the specimens. Particular and exact descriptions should accompany them, or the specimens will be of little value or interest.]

LARGE PRODUCTS OF CORN.

[The letter of Mr. Coleman, which is referred to below, has already been inserted at length in the Farmers' Register—at page 359, vol. I.]

To the Editor of the Farmers' Register.

We agriculturists are, in general, the greatest gulls imaginable in regard to all spick-and-span new things—matters of which we have never

heard before, and upon which, therefore, we can have no pretence to exercise our own ineffable self-conceit. At the same time, we often show ourselves to be the veriest infidels upon earth as to every new thing affirmed of what we believe that we understand very well, merely from having been long accustomed to it. Our own comparatively limited experience is made the standard of all that is knowable or attainable, in relation to such matters. Thus the owners and cultivators of poor land, as most Virginia farmers are, will generally be found—not only ignorant of what actually *can* be produced by soils, either naturally or artificially very fertile, but they are utterly incredulous when they hear of any crop which they themselves have been used to cultivate, being elsewhere made to a far greater amount per acre, than they have ever made, or seen others make.

Of these general truths, I lately witnessed a most striking exemplification. Happening to be in a large company, and the conversation turning upon agricultural subjects, I ventured to state, upon such authority as I thought would not be questioned—authority, in fact, that any court of law would have deemed sufficient, that a certain number of barrels of corn, far exceeding the average quantity, had been made on a single acre of land, on the South Branch of the Potomac. The derisive stare of incredulity was plainly legible upon several countenances—not that any seemed to doubt my having heard what I stated, but these skeptical gentlemen evidently disbelieved the fact itself. Indeed, one of the company commenced a calculation, but soon stopped short, to prove that the quantity of corn said to have been produced by the acre, would have more than covered the whole surface, if the ears had been spread on it as close as they could be placed side by side. Now, not a shadow of doubt could have been either felt or expressed by an individual of the company, (who were, most of them, farmers or planters,) had they given themselves the trouble to read the various accounts which have been published from time to time, in all our agricultural papers throughout the country, and authenticated as satisfactorily as any judicial record, that still larger quantities of corn have been made per acre, than the quantity mentioned by me, which seemed to excite such unexpected incredulity.

With a view to show that I have the requisite proofs to confirm my assertion, let me beg you to re-publish from the 15th volume of the American Farmer the following accounts of extraordinary crops of corn made in different parts of the United States, in regard to which, all the facts seem to be just as well authenticated as that *you* publish the Farmers' Register. Besides curing, I hope, the skepticism of the gentlemen to whom I allude—who will probably see this statement, it may serve the still more valuable purpose of stimulating others to exert themselves in improving their corn-lands far beyond any degree of fertility which they have heretofore believed them capable of attaining.

In the 15th volume of the American Farmer, page 243, you will find the following facts copied from the New York Farmer, to the editor of which they were communicated by a Mr. Henry Coleman of Massachusetts. He says, "they were submitted to the most careful examination, and established by the fullest proof."

"John Stevens, of Hoboken, N. J. produced on one acre 118 bushels, 2 quarts. Mr. S. was confident he would have had considerably more corn, had not his crop suffered very greatly by a thunder-storm, which laid the greater part of it down at the time the ears were setting. On this crop a bet of 50 guineas was pending. The motives to exact measurement were such, therefore, as to secure accuracy. This was some years since: the particular date I am not able to ascertain."

"Dr. Steele, of Saratoga, in giving an attested account of the crops of Earl Stimson, in 1821, says, that he had eight acres of Indian corn, which yielded 112 bushels to the acre—896 bushels; ten do. do. 90 bushels to the acre—900 bushels.—(Memoirs of the New York Agricultural Society, vol. II, page 73.)"

"The following individuals applied to the Agricultural Society in Washington county, Pennsylvania, in October 1823, for premiums, with authenticated evidence of the quantity raised per acre on not less than five acres: Joseph Evans, 136 bushels; John Wolf, 127½ do. do.; Samuel Anderson, 123 bushels, 12 quarts do.; Isaac Vanvoekers, 120 do. do.; Isaac Buckingham, 118 bushels, 1 quart do.; James Clakey, 113 do. do.; Jesse Cooper, 108 do. do.; De Gross Jennings, 120 do. do."

"In the same year, the following individuals applied to the Alleghany county Agricultural Society, for premiums on their crops: James Anderson, of Ross township, 103 bushels, 17 quarts on 1 acre; John Snyder of do. 103 do. per acre on five acres; John Irwin, of do. 105 bushels, 20 quarts per acre on four and three-quarter acres; William McClure, 129 bushels per acre on five acres.—(Memoirs of Pennsylvania Agricultural Society, vol. vi. page 228.)"

"In 1822, J. & M. Pratt, of Easton, Madison county, New York, obtained from one acre, 172½ bushels do. do. 161 do.—do. do. 161 do. In 1821 the same gentlemen obtained from four acres 680 bushels, or 170 to the acre." Their crops were subjected to the particular examination of committees for a premium: and they say they have no doubt of being able to raise 200 bushels per acre."

"In 1823, Benjamin Bartlett, of Easton, Madison county, N. Y., obtained from one acre, 174 bushels. The veracity of this gentleman is equally unquestioned, and his too, was a premium crop."

"In 1831, Benjamin Butler, of Oxford, Chenango county, N. Y., states that he raised 130 bushels at 60 lbs. to the bushel, or 140 bushels at 56 lb. per bushel.—(New England Farmer for Nov. 1831.)"

Fifteen other cases, all substantiated by evidence perfectly satisfactory, are stated by Mr. Coleman, of corn crops made in the cold, uncongenial climate of Massachusetts, from the year 1820 to 1831, where the produce per acre varied from 110 bushels—the lowest, to 142 bushels—the highest quantity made. But if any of your readers should wish to see Mr. Coleman's own statement, let him turn to the volume and page of the American Farmer to which I have referred.

Now, I beg leave, to inquire—nay, to demand of our self-satisfied, opinionated Virginia farmers, why *they* cannot go and do likewise? Why *they* cannot, at least *equal* the crops of our eastern ag-

ricultural brethren, who are so justly celebrated for their industry and enterprise? *They* have to contend against the natural obstacles of a bad soil and climate, unpropitious to the corn crop, which is best adapted to a more southern latitude. *We*, on the other hand, are blessed, both with a soil and climate admirably suited to its growth and productiveness. Shall *we* then, neglect—nay, *despise* these incalculable advantages? Shall we not rather bend both body and mind to avail ourselves of them to their fullest extent? Shall we always content ourselves to be at the laboring oar—to be common and inferior sailors, when we might justly aspire to command the ship? Oh! forbid it every feeling of allowable state-pride—every just estimate of the rank we southern agriculturists are entitled to hold, in our body politic.

Pardon, my good sir, this slight exhibition of professional and state-partiality. Most persons will probably say, that the occasion did not justify it; that it is a hop, skip, and jump, kind of business. But there is no tracing the concentration of ideas in such desultory thinkers as myself; for I may address you at Shellbanks, and land you—if you please to follow me—on the summit of Chimborazo. Should your readers therefore, not be able to go along with me so far, as to attribute what I have written to an adequate cause, I shall reconcile myself as well as I can, to their condemnation of your friend and constant reader.

J. M. G.

From the Genesee Farmer.

THE HORSE RAKE.

"The horse hay-rake was invented by a colored man who lived on Hempstead Plain, on Long Island. He died about the year 1821. It was introduced into Pennsylvania by Michael Newbold, of Oxford, Philadelphia county, about the year 1812, in consequence of the representations of a Yankee pedlar, who instructed him how to make one. His first rake was destroyed by a malicious person who feared its innovating effects on the price of labor. The original rake is preferable to the patented one, except on smooth level ground. With us the horse rake is an indispensable implement, and has lessened the expense of hay-making one-third, and perhaps in some cases one-half."

Who can give us the name and history of the original inventor of the horse rake? Whether he was black or white, bond or free, he ought to be known as a public benefactor.

For the Farmers' Register.

MONTHLY COMMERCIAL REPORT.

Another month of comparative inactivity in the trade of Virginia has elapsed, taking previous years as a criterion. The navigation of our rivers has been a second time closed by ice, and even that of Chesapeake Bay was obstructed.

Tobacco is the only article of which the usual supply has been brought to market—but this is not the season of the year for large receipts. The

price has undergone little change: if any, it is in favor of the planter.

The price of cotton has fluctuated a little. It advanced to 15 to 15½, and has declined to 14½ to 15½ cents. The operations have been to a small extent, owing to the moderate supply, and to the holders requiring higher prices than can be realized in foreign markets. The receipts in the southern and western ports continue to exceed those of last season to a great extent.

One heavy operation in city mills flour is reported, say 15,000 bbls. The market has not been brisk. City mills \$5½ to \$5¾—country brand \$4½ to \$4¾.

The annual returns of the import and consumption of American products in Europe, furnish, among other, the following statements.

Import and consumption of cotton in Great Britain.

	IMPORT.		CONSUMPTION.	
	U. States.	All sorts.	U. States.	All sorts.
1830	618,750	871,950	539,050	805,500 bales
1831	608,750	905,200	618,600	881,500 "
1832	628,850	901,700	630,250	877,800 "
1833	657,750	933,100	655,750	899,100 "
1834	731,350	948,500	695,600	904,500 "

Consumption of cotton in France.

1830		250,800	"
1831		243,900	"
1832		272,600	"
1833	200,400	276,400	"
1834	234,200	301,600	"

Exhibiting an increase in both countries, and this increase is enhanced by the greater number of bales from the United States consumed each successive year, the weight of such being heavier than those from other countries. Thus, if the bales are estimated to average 300 lbs. each, the consumption in Great Britain would appear thus:

In 1830	721,000 bales of 300 lbs.
1831	781,000 "
1832	859,000 "
1833	890,000 "
1834	972,000 "

The stocks of tobacco remaining on hand in Great Britain and Ireland at the close of each year, are reported as follows:

1829	36,500 hhds.	1832	28,600 hhds.
1830	33,000 "	1833	25,500 "
1831	33,000 "	1834	26,400 "

The quantity taken for consumption in each year varies so little as not to be worth notice, but it scarcely exceeds one-half of the smaller quantity above reported, and the remainder is re-exported from England to other countries.

What effect will be produced on commerce by the recent cessation of diplomatic intercourse between this country and France, remains to be ascertained—but the immediate one is some decline in the price of cotton—probably of public stocks and of ships.

It is decided that no addition will this year be made to the banking capital of Virginia.

X.

Feb. 24, 1835.

ON RAISING CEDARS FROM THE SEED, AND TRANSPLANTING THEM FOR HEDGES.

[We annex below the extract referred to by our correspondent, and thank him for pointing out what we had forgotten, and still more for adding thereto his own experience on the subject.]

To the Editor of the Farmers' Register.

Fayetteville N. C., Feb. 16th, 1835.

Mr. S. Hobson (whose inquiries were made in your No. 9) will find in page 22 Vol. III. of the American Farmer, the mode of raising cedar hedges from the seed. I have followed the directions given there with the most satisfactory results. More than half the cedar berries prepared and planted agreeably to those instructions vegetated and flourished well.

I have not lost more than one tree in 50 by transplanting, unless the tops were cut off. In that case the trees die or decline so as to be of little account: they will improve by severe trimming if the top is left perfect.

I prefer a wet season in March or April for transplanting ever-greens, but have succeeded by taking proper pains at all seasons, except the extremes of heat and cold.

B. B.

From the American Farmer.

Gather the berries in November or December. Rub off the skin and wash the kernels—rubbing them well between the hands, so as to get off as much of the resinous substance as possible, then mix them with unslacked ashes, and let them remain in the ashes for a fortnight; then plant them in drills as you would peas, and they will vegetate and come up the following spring; and being well nursed, they will in two years be fit to plant out in hedges—about the first of March is the proper time for planting them—throw into the bottom of the trench, light rich earth, such as may be had from the surface of productive ground. When the trees attain three feet high, you should begin to train the hedge—about the middle of summer, is a suitable time for this operation, and it ought to be carefully continued until the hedge is as high as you may desire it—about seven feet high, and three and a half feet broad is sufficient.

N. B. The better you cleanse the kernel, the more certainly the seed will vegetate—by proper care an excellent hedge may be expected in seven years which for beauty and durability, cannot be surpassed either by thorns or any other growth.

From the Genesee Farmer.

SOUR SOILS.

Mr. Tucker—Are not Mr. Ruffin's ideas about sour soil* more fanciful than true? I believe that we may analyze our soils as strictly as we please, and find nothing in them assimilating to oxalic acid. That this acid exists in sorrel, and many other vegetables, I conceive is no proof that it exists in the earth. Remove the sorrel and other vegetables, and then analyze the soil in which they grew, and if any oxalic acid is found, then we may conclude that it exists in the soil; but if

not, I think we should conclude that it is derived from the atmosphere like most other peculiarities found in vegetables—such as potash, sugar, lime, gypsum, aroma, tannin, &c.

It appears to me that plants derive these by the peculiar formation of their pores, in the same way that a crab apple stock is made to produce the sweet pippin by grafting, but I may be mistaken and really wish for information.

DUBIO.

[The author of the work referred to above is both willing and anxious to have the doctrine of the acidity of soils, as well as any other of his novel or doubtful positions, submitted to the test of the most rigorous scrutiny—and is ready to defend them, if necessary, or to yield to and abide by any just condemnation pronounced by those more enlightened by science, or by experimental knowledge. But it is unnecessary to reply to the doubts or objections of a writer on the properties of soils, who sets out with assuming that the lime and gypsum "found in vegetables" "are derived from the atmosphere."]

REMARKS ON PUTRESCENT MANURES, AND THE OPINIONS OF J. B. ON THAT SUBJECT.

To the Editor of the Farmers' Register.

February 14th, 1835.

Dear Sir—In the January No. of your excellent journal, [page 497] there is a long communication signed J. B., with which, upon the whole, I have been very much gratified—not only because it is upon a subject highly interesting to all owners of soils which require manures—as most of our Virginia lands do most sadly—but because the writer has, in my humble opinion, treated it remarkably well. Still, as all men will differ, and as he himself has invited the utmost freedom of discussion in regard to every opinion which he has advanced, as well as to the arguments urged in support of it, I will venture, in my desultory way, to offer some remarks on particular parts of his communication.

To prevent any misconception of my motives, on account of the character of my comments, I will merely add, that I do not believe the public attention, in these times, can possibly be attracted generally, to any discussion whatever—no matter how important the subject may be, unless the parties engaged can prevail upon themselves to spice it as highly as they can. The public taste is deplorably vitiated in this respect—and consequently, must be indulged to a certain extent—even where the sole view is, to correct it: just as a doctor envelops his curative physic—or what he hopes will prove so, in something *not medicinal*, merely because it will not otherwise be swallowed. With this key to all I mean to say, your correspondent, I hope, cannot mistake my feelings towards him, or my motives for expressing myself as I may do—being perfectly willing that he, or any other correspondent of yours, should make equally free with every opinion or argument I may utter.

The first of his assertions from which I must dissent, is that which he has italicised, and thrown into the form of an antithetical axiom. Since he seems to design it as a kind of corner-stone to

* Gen. Far., vol. 4, p. 335 and Farmers' Register p. 633, both quoting from the Essay on Calcareous Manures.

much of his superstructure, it merits particular examination. "*Facts*," (says he,) "*the causes of which are not understood, are not truths, and serve only to mislead us.*" In this sentence, short as it is, there are two unqualified assertions, totally inadmissible as they here stand. Throw them into the form of a syllogism—which is the way to test them—and where would they land us? Not, perhaps, "in the slough of despond," but "in confusion worse confounded." Let us try two of these syllogisms to prove how far I am right.

"*Facts, the causes of which are not understood, are not truths.*"

But most of the facts stated by J. B. himself proceed from causes, not understood.

Ergo—most of J. B.'s facts "*are not truths*"

Again. "*Facts the causes of which are not understood, are not truths.*"

But the causes of the fact that we exist, are not understood. Ergo, it is not a truth, that we exist!!

I could go on, sir, to fill your Register with similar syllogistic arguments, wherein the conclusions would all be undeniable from J. B.'s premises; but the two just stated suffice to show that his axiom is a contradiction in terms. Nay, admit it to be correct, and it would reduce the sum and substance of all human knowledge nearly within the compass of a nut-shell. It would do still worse; for according to him, all the facts in the world, "*the causes of which are not understood, serve only to mislead us.*" To prove this assertion equally untenable, I will ask but three short questions. Is the negro who mauls our rails after long practice, misled by not understanding the cause of the fact that the wedge acts as it does? Is the carpenter misled in boring an auger-hole, or turning a heavy piece of timber with a handspike, if ignorant of the cause of the fact, that the screw and the borer work as they do, in those operations? Or is the ploughman misled by the fact that his plough cuts, and its mould-board turns the furrow-slice, because he understands not the cause of either effect? God help us, if they were, or their masters either, who are often nearly as ignorant of all these matters as themselves.

The worst that can justly be said of facts—the causes of which are not understood, is, that such facts *may* mislead us; but why, considering man's natural desire for knowledge, they should oftener lead him wrong than right; or should always so far *mislead*, as to deprive them of all right to be called *truths* as well as facts, I must believe would puzzle all the logicians in the world to prove. Certain it is—at least to my mind, that J. B. has utterly failed to sustain so strange a paradox—nay, so palpable a contradiction, by any thing bearing the semblance of proof.

The next of J. B.'s assertions to which I object as deficient in proof, is the one wherein he is endeavoring to show an analogy between the earth and the human stomach, for the purpose of demonstrating that as the latter requires cooked food for the nutriment of the body, so the former requires *cooked manure*, (if I may so express myself,) for the nutriment of the plants which grow on it. His words are—

"Raw meat and vegetables contain more nutritive matter for the human stomach, than after the loss necessarily sustained by their being cooked: yet the remainder, after this process, is fitted for

the sustenance of man, and *therefore is more valuable than the whole was before the change, and the waste caused by cooking.*" Now, not to say one word of the vast difference between nature's and man's cookery, so forcibly illustrated by the old adage—"God sends food, but the devil sends cooks;" nor of the fact, that nature alone is capable of cooking food for plants, there are, I think, numerous facts to prove that the above assertion of J. B. is altogether untenable. Not to insist upon the undisputed case of Nebuchadnezzar, (I mean no irreverence, Mr. Editor,) who lived seven years upon raw vegetables, and reigned a considerable time after as a great king, I will confidently ask, if any people among ourselves, generally appear better "*fatted*," (as we say of our cattle and hogs,) than that numerous class styled gourmands and epicures, who eat all their meats in a state so nearly raw, that the little warming imparted is really not worth mentioning. Again, all men eat a large portion of their vegetables raw. Such is the state of salads of every kind, cucumbers, onions, celery, &c. when taken into the stomach. Nay, that vile article called cold-slaugh, so great a favorite with thousands of our citizens, and which, in plain English, is nothing more than raw cabbage with a few condiments added, has been ascertained by Dr. Beaumont, to be by far the most digestible of all the varieties of food with which trials were made, in his very remarkable experiments, at the City of Washington two years ago, upon the stomach of a man who had a hole in his side, through which, the food was introduced.

The last of J. B.'s assertions against which I beg leave to enter my dissent, is that wherein he speaks of the coarse manure of our farm-pens, composed, in great part, of corn-stalks. Of this he says, among other assertions, that, "every corn-stalk serves as a flue or chimney, to carry off the gases which are evolved." Now, unless there are such things as flues and chimneys stopped at both ends, which can still carry off such subtle vapors as gases, or corn-stalks without joints, of which I have never yet heard, this last assumption is equally untenable with the others which I have taken the liberty to examine. Even admitting that every corn-stalk was a firm, hollow tube from end to end, before it could act as "a flue or chimney," one end at least must be higher than the other, and the lower one not stopped up with earth, (as it must be, if below the surface,) but *open*, and sufficiently near the ground for the atmosphere to force into it whatever is expected to pass upwards through it. True it is, that corn-stalks, in process of time, become hollow at the joints, as well as between them; but not until every thing in the form of gas has very nearly or quite made its escape.

Having done with what appears to be the faults of J. B.'s communication, I proceed to the more agreeable task of commenting on its merits. Of these, I think, I may venture to assert, that you have had no correspondent since your Register commenced, who has manifested a more thorough acquaintance with the opinions of all the best writers on the subject which he has undertaken to discuss; nor any who have selected topics of greater interest to agriculturists, or better suited to the chief objects of your paper. He has given us scientific theory and practice combined, as they

always should be; and if one who has no great stock of either, may venture to offer his mite of contribution towards the attainment of your well informed correspondent's purpose, I will now present it in the most intelligible way I can.

Throughout J. B.'s communication the predominant opinion seems to be, that the best general practice in regard to the preparation and application of manures, is, that they should be used in the freshest state compatible with whatever degree of fermentation may be necessary to fit them best for food to plants. This seems to be the present opinion of a vast majority of the best informed agriculturists—both in Europe and America; and it appears to be as clearly proved as any thing of the kind can be—provided we take it for granted, that previous fermentation, by man's management, really is indispensable. But the great "*modus vindice dignus*,"—the grand difficulty to be overcome is, to ascertain what should be the precise degree of this supposed essential fermentation. Nearly the whole puzzle, in my humble judgement, arises from all parties having assumed it as true, that from the incipient to the final stage of fermentation in manures, both the evaporable and evaporating substances, not only all constitute the food of plants—which has never been proved; but that all have a greater tendency to unite with the atmosphere, than with the earth, which is also an opinion without any thing like satisfactory proof. Now there is an hypothesis, which I will father, if no one else has a previous claim,—an hypothesis strongly corroborated, I think, by J. B. himself, (as I will hereafter show,) which, if true, will go farther towards putting this much vexed question to rest, than any other that I have ever noticed.

The earth has truly been called the matrix or common mother of all plants, except the very few that 'tis said, will grow in the air suspended by a thread. Of the natural food for her offspring, she herself possesses, as all admit, a very large quantity; but not having enough, where too many and unreasonable exactions have been levied upon her by the reckless cupidity of man, an all bountiful Providence has given her the power—a kind of chemical affinity or elective attraction, (as I beg leave to call it,) of drawing to herself and uniting with all extraneous substances, in contact with her surface, which are susceptible of conversion into the food of plants. This conversion begins the moment these substances touch the earth, if there is any moisture in them, and continues, until the rains dissolve every thing in them, capable of solution. Admit this, and does it not follow, as a necessary consequence, that the earth, which is the natural mother of a vast majority of all the plants known to man, must have a much stronger elective attraction for every kind of food essential to the healthful nourishment of her children—food which she herself has to administer below her surface, than the atmosphere can possibly have, which is not their natural parent, and has nothing to do with their nurture, until they appear above ground? If she has, then will the conclusion be irresistible, that all the gaseous substances which are supposed to be component parts of the food of plants, will first impart, while in solution, to the earth herself, such portion of that food, as she alone can prepare and administer, rather than wait to be carried off with some sort of gas to the

atmosphere, where it cannot be used, simply because the means and appliances used by the latter, for the nurture of plants, are materially different from those used by the former, each having distinct functions to discharge for the accomplishment of the same great end, which is the perfection of every plant that grows. Again, having these distinct functions to discharge, which none I believe deny, even supposing the earth and the atmosphere to be sentient and moral beings, is it rational to conjecture, that either would, if it were possible, deprive the other of any means to promote a common object, which that other alone could apply? Would the earth keep gas, (which, by the way, is as great a physical impossibility as to prevent water from seeking its level,) when she could not apply it to the nurture of her children—that application being the natural province of the atmosphere? Or would the atmosphere take from her sister—were such robbery in her power, any nutritive substance which she herself was incapable of applying? A negative answer, I think, would be given to both these questions by every man whose sole object was *truth*.

The only thing assumed in the foregoing hypothesis is, that the earth and the atmosphere having to nourish plants in a different manner, and by different means—one being the nurse below, and the other above ground, neither can possibly take from the other, *any thing* which itself cannot use for their joint object. Of course, nothing *will be taken*; and of course, there can be no danger in spreading manure on the surface of the earth as soon as it may be convenient to do so. In support of this theory, I will now adduce, among other proofs, the premised fact from J. B. himself. 'Tis true that he gives it in the form of a simple assertion; but all, I think, will admit it to be both a fact and a truth, although not according to his logic.

In commenting upon what he calls "the causes of waste" in the making and applying manures, he says:—"Fortunately however, for the fertility of the earth, bountiful nature offers to the soil much more than it is deprived of by fermentation: and however great may be the losses sustained, *still the gains are greater*." Although he has not specified how these gains accrue, it must be obvious to all, that it cannot be, in any other way, since the mode is a *natural*, not an *artificial* one, than by the frequent deposite, on the surface of the earth, of all the deciduous parts of trees and smaller plants. In this mode, you see, nature applies all *her* restoratives to the surface, there to be dissolved by the rains, and absorbed by the earth, which retains *her* proper portion, while the exhaling gases impart to the atmosphere *her* congenial part, thence to be returned to the plants through the absorbent vessels of their leaves and other parts. To talk of the latter committing upon the former, either grand or petty larceny, in stealing *her* property, or to speak of nature as *losing* or *wasting* any thing, seems to me, a slander upon *her* character. God leaves *that* folly to be committed—only by his creature *man*, during the various trials to which he is subjected for his own good.

In the last quotation from J. B. we find the opinion very distinctly expressed, that nature herself, in process of time, restores to soils, in some way or other, more than they are generally believed to lose by fermentation. But I beg leave to inquire,

why suppose any loss at all from this cause? If the natural means of restoration, only alluded to by J. B. he, (as I suppose,) the rotting upon the earth's surface all the deciduous parts of trees and smaller plants, what is the *modus operandi*, as far as we understand it, of effecting this restoration? As it is nature's method, we must believe it *the best*; and where is the necessity of supposing it any thing *lost* in the process, since it is quite irrational, as well as unscientific, to imagine *her* capable of wasting any of her precious gifts to man? Would it not be much more consistent, both with science and reason, to suppose, that such parts of her deposits as are designed to restore to the earth her diminished power of nourishing plants—a power which the folly and ingratitude of man alone may have impaired or destroyed, are converted to that use without any loss or waste whatever, than to imagine that the atmosphere stole a part of these deposits—a part too, which the atmosphere could not apply? Would it not be a much easier solution of the seeming mystery, to believe, that the earth and the atmosphere, by their own peculiar elective attractions will and must divide between them, all the food of plants contained in manure, whether such manures be above or below ground; and that therefore, interposition by man can only injuriously retard, but cannot prevent it? Nay, that he cannot, by any imaginable contrivance, cause the one to encroach upon the functions of the other, since nature has proclaimed to each—“*thus far shalt thou go, but no farther.*”

In nature's method of restoring exhausted fertility, there is no heaping and piling, and turning, and hastening or retarding fermentation; but when the rains, and the dews, and the heat come from the heavens, the process of converting the deciduous parts of trees and smaller plants into proper food for themselves and their successors, commences and goes on with more or less natural rapidity, until it is finished—the earth doing *her* duty, and the atmosphere *her*'s, without the possibility of any interference whatever. Such an unnatural conflict can have no existence but in the vagaries and vain imaginings of man himself. Now, if the admirable rule, “follow nature,” is to be any guide for us in improving our lands by manure, how is this to be done? Is it by applying them to the surface, or burying them below it? The answer to these questions, if candidly given, would end the controversy forever. But it will be said perhaps, by some who loathe the trouble of studying any subject thoroughly, “this is all *theory*! what says *practice*?” Let us try then, whether their great oracle, *practice*. (great, I admit it to be, when truly scientific,) affords no testimony conclusively favorable to the opinion which I have ventured to advance. I myself can testify to four different experiments, made with great accuracy, upon cow-pens, alternately ploughed up on removal, and left unploughed, having been made and continued from the earliest period in the spring, at which cattle are penned, to the latest time in the fall. The pens were regularly removed once a fortnight—the size of each pen was exactly the same, as was also the average number of cattle, during each fortnight, without any variation worth noticing. In every case, without a solitary exception, a purblind man might have seen the difference, most distinctly marked, in favor, not only

of the corn crop, but of the wheat crop also, which immediately followed. The rationale of these facts I have already attempted to explain; and if such explanation be deemed satisfactory, your correspondent J. B. I hope, will admit them to be *truths also*. Experiments precisely similar, and with the same results, have been stated to me by not less than ten or fifteen gentlemen of unquestionable veracity—so that I, at least, no longer entertain a shadow of doubt, as to the best management of the manure from spring, summer, and fall cow-pens. If ploughed in, the soluble parts very soon unite with the subjacent stratum of earth, at a depth too great for such fibrous rooted plants as form the chief of our staple crops, to derive much, if any benefit from them; while such portions as have a stronger chemical affinity to the atmosphere, inevitably find their way to it, although somewhat more slowly perhaps, than if left on the surface. To suppose it possible for gaseous substances to be confined below the surface of the earth, at any depth to which manure is ever buried—unless indeed, they were hermetically sealed up in vessels of glass, stone, or metal, seems to me a supposition that would never enter into any man's head who had the least knowledge even of the simplest principles of chemistry. But unless such confinement were practicable, merely by the ploughing in of manure, then the above objection to this process appears to me sufficient to prevent its adoption. When manure is spread on the surface, as nature spreads all her fertilizing substances, the parts of it which naturally have a greater tendency to unite with the earth than with the atmosphere, will all certainly do so immediately after the rains and dews dissolve them; and that too, to the average depth best suited to a great majority of the plants to be nourished by them.

But the great doubt, the grand difficulty with us slovenly Virginia farmers, is said to be, how to manage that principal dependance for improving those exhausted lands which have been nearly murdered by our barbarity and ignorance. I mean the coarse farm-pen manure of which corn-stalks constitute, at least a most conspicuous, if not a very useful part: *corn-stalks*! those treacherous little rogues that contrive to steal away our farm-pen gases, in a manner heretofore so unsuspected, and hitherto so inexplicable.

If hearsay testimony were admissible, I could adduce much in which I myself entirely confide, to prove that surface-application is best, even for coarse farm-pen manure. But unfortunately, I have personal knowledge of only *one case*, which having happened on my own farm, where all the circumstances occurred under my own eye, I will venture to state. In regard to the result, there could not possibly be any mistake; neither was there any in the facts which I shall detail. If my hypothesis be deemed insufficient to explain the whole, both as to cause and effect, I invite J. B. or any other of your numerous contributors to try his hand at expounding.

The case to which I allude, was the following. Some years ago, I had spread and ploughed under, (according to Col. Taylor's plan,) as much of my farm-pen manure as I supposed would suffice for that part of corn land—previously ploughed up in beds to be reversed, which I had allotted to receive it. The pens, however, produced more than

I expected. This I had spread on the adjoining corn-ground, which had been planted, but was not up. There it remained for some weeks, until the corn received its first working, and then was not buried as deep as the other manure ploughed under before the corn was there planted. The quantity of the surface-spread-manure per acre, was as nearly equal as the eye could make it, to that which had been ploughed under—for I had no idea at the time, of making an experiment to favor a preconceived opinion, and of course, did not attempt, as most men are too apt to do under similar circumstances, so to manage the trial as to suit that opinion. Indeed, my belief, (adopted merely from faith in others,) then was, that it was best to turn in all kinds of manure. The result of this accidental experiment was, that the corn upon the land whereon the manure was applied to the surface, not only maintained the start which its being first up gave it, but manifestly increased that superiority in a ratio considerably exceeding the difference which that circumstance alone could create, and at last produced much more in proportion. The excess was too plain to require accurate measuring to ascertain it; and having no idea at the time of publishing the experiment, the usual measurement by a tub was not made.

Having the same object in view with your intelligent correspondent J. B., which as I understand him, is to elicit discussion in regard to the principal subject of his communication, I submit the foregoing views to be disposed of as you may deem best; and remain

Yours with much esteem,

J. M. G.

MARL AND MARLING—SPECULATIONS UPON WORLD MAKING.

To the Editor of the Farmers' Register.

Airfield, February, 1835.

I feel that I am delinquent, especially to yourself, and through you, I am so to Professor Rogers. You were kind enough, a long time since, to ask me to send to the latter, specimens of the Henrico marl, to be analyzed by him. Circumstances and the badness of the weather, have delayed a compliance with your request. It shall not be postponed much longer. A late trip to the Rappahannock enabled me to obtain a specimen of the marl in King and Queen. I had not visited that country for six years. The road crosses the ridges which lie between the Chickahomony and Pamunkey—the Pamunkey and Mattopony—and the latter and Rappahannock—and, like most of the roads in Virginia, passes over the least valuable and interesting parts of the country. From all I could see and learn (by frequent inquiries) many persons in Hanover, King William, King and Queen, Middlesex, and Essex, have commenced, with spirit, the improvement of their lands, by the use of marl, and other manures. To my eye, a decided improvement had been made since I had last been in that section. I saw one field that had often attracted my attention by its extreme poverty, which has been completely resuscitated by two dressings of marl. It produced a heavy crop of corn last year, and is now neatly sown in wheat, that looks better than any other wheat I saw. The soil seems to have been com-

pletely changed in appearance. It was once, like the adjoining field, (not yet marled,) miserably poor, and light—abounding in silex, but in a fine form. Now, it has a greasy, chocolate appearance, that, at once, bespeaks its fertility. I was told that its production has convinced the most ignorant skeptics of the fertilizing qualities of calcareous manures. Vegetable matter was, of course, mixed with the marl. When the land is too poor to put forth a sufficient quantity of vegetation for the marl to act upon, the practice is, to haul oak leaves, pine beads, and other scrapings from the woods. I saw sundry fields, of some extent, regularly dotted over with four or five bushel-heaps of the blue marl, so full of shells that, at some distance, they looked like heaps of snow—the rains having washed down the loose blue clay. This marl is like that found in Henrico and Hanover—having the same sorts of shells—but the blue earth is so filled with fine particles of shells that I suppose one-third of it is calcareous matter. From the centre of one of these heaps the portion was taken, intended for Professor Rogers. I was informed that this sort of marl was found in the branches and swamps; but, that, in the hill-sides, a *yellow marl* was found, much richer, and, of course, more valuable from that consideration, as well as from the facility of getting it. I was not able, in a hasty trip, to get a specimen of it.

The whole tide-water country on the north side of James River has been already much benefited by your Essay on Calcareous Manures, and your still more valuable *Farmers' Register*. If there be any truth in the motto of the *Register*, you have abundant cause to feel satisfied, and ought to sleep sound of nights. The great men who live upon the malicious wranglings, the frauds and the crimes of mankind, deserve less grateful respect from the community, than those who teach us *the way to live*, and to turn the bounties of heaven to our advantage and comfort.

May we not hope that a new spirit will soon animate our people, and enable them to develop the beauty and advantages of our mother state? The wasting tide of emigration can only be checked by such a spirit, aided by legislative assistance. There are none of us who do not need instruction; and the want of schools is forcibly illustrated by the difficulty of employing, in many parts of the state, an overseer, miller or white laborer, who can read and write. It is remarkable that, in those sections where the means of subsistence are most laboriously obtained, and there are less desirable markets for the products of industry, more attention has been paid to common schools, and the difficulty here spoken of, is less felt. Out of as many as fifty applications that have been made to the writer for such employments, not more than half a dozen of the applicants were able to read and write. What, may we not ask, have been the results of the enormous expenditures from the *primary school fund*? Is there not some crying defect in the whole of our school system? Ought not our legislature to try some other plan? Why not copy the successful systems of some of our sister states? How often does it happen, that when a young man is too proud, or too lazy, to work, and too *worthless* to get or retain employment in business, that he sets up as *schoolmaster*, and is entrusted with the important charge of the morals and education of children! What an error!

How destructive of the hopes of the rising generation! I leave this subject to the elucidation of some abler pen. It is one intimately connected with "the improvement of the practice, and support of the interests of agriculture," and claims a full share of the reflection and labor of yourself and able correspondents.

The whole of the country from the James to the Potomac River has been, from an early period, under an exhausting system of cultivation and grazing. But few farms have had the benefit of amelioration, or even of a judicious rotation of crops. And, it would astonish a farmer from Europe to know this, and see the crops which they still yield, with careless and imperfect cultivation! Under all circumstances, the products of the highlands are more surprising than those of the bottoms, which are so often improved by deposits from the former.

The highland of the whole region north of James River, and below the granite ledge of rocks, taken together, would present to one, raised above, and viewing it, in perspective, a great plain gradually inclined to the ocean, unbroken by mountains or hills. Yet, it is cut up, in every form, direction and fashion, by depressed valleys or bottoms—deep, precipitous ravines—and by long and wide and still deeper gashes, through which the rivers and principal streams wind their devious courses into one another, and then mingle with the waters of the noblest bay on earth. A view of this region might present, to the geologist, materials for his profoundest reflections, and sustain or refute theories that have puzzled and divided the thoughts of wise men.

Appearances tell us that the principal rivers and streams, once covered the beautiful and fertile bottoms through which they now glide. Their deeply sunken beds are defended, in many places, by high banks which exhibit various strata of earth and sand of every variety of color. These high banks are, generally, opposite to marshes which gradually rise into level cultivated flats, extending to the foot of the main highland-plain of the country. I have but seldom seen, on the flats of these rivers, that the lands were much lower at the foot of the hills than the level of the high banks near the stream. This I know to be, very generally, the case with the flats on the great western streams. But may we not suppose, that in the length of time, since the clearing of the adjacent lands, these depressions, if they ever existed, have been filled up by washings from the hills? Such will hereafter, no doubt, be the result in the west. But the river hills there, are so light in texture, or contain so much decomposed vegetable and adhesive matter, that it will take as long to make them run off with the rains, as it did with us.

These remarks apply, in a great degree, to the smaller streams. On them we see similar geological and topographical appearances. They are, however, subject to overspread their banks, and sometimes most disastrously, from heavy and continued rains. These inundations sweep off the soil from one place and deposit it in another; but they are gradually decreasing in extent. This is obviously owing to three causes: 1st, the clearing and cultivation of the country—2nd, the sinking of the beds of the streams by constant, and often violent attrition—3rd, the diminution in the

waters of every stream in eastern Virginia by the disappearance of so many springs, and the increasing aridity of the whole country. The disappearance of springs, the failure of wells, and the drying up of wet spots, both on high and low land, united with the fact, that, if the average quantum of rain be not much diminished, the humidity of the atmosphere is perceptibly less, are facts that have attracted the attention of every observing man who has reached his fiftieth year. The causes of all these changes in our climate, and of some other appearances which I shall presently notice, deserve investigation; and might be usefully explained by men of ripe learning, who can discard the plausible seductions of abstractions and theory, and give common sense and observation a share in their speculations.

Whether or not the deep cuts and depressions we see in this whole region have been caused mainly by the washings of the rains and the constant abrasion of the streams is an interesting question. The moment we enter upon its consideration we are beset by difficulties, and ocular proofs that the earth never could have been formed with all its present irregularities of surface: for it can hardly be supposed that the Great First Cause created the shells, the bones, the sea mud, and diversified strata we find, and that he then distributed them so capriciously.

Was the land primarily covered with water? This seems to be conveyed by the Mosaic account of the creation—but whether the earth existed as a solid body, or was held in solution, as chemical acids hold the hardest metallic substances, and was then precipitated, or crystallized, is matter of curious speculation.

With many, it is a favorite theory, that the whole earth was, originally, rocks of different sorts; and that the clay and soil have been formed by the decomposition of these rocks, and of vegetable matter. This theory, however, seems to be disproved by the fact, that on the second day, the earth was commanded to bring forth grass, fruit, &c. Still, it is obvious, that a decomposing process is constantly going on in many of the rocks on, and near the earth's surface. Whoever doubts this will be convinced by examining the soil on a hill-side that is interspersed with granite or sand stone. The mouldering condition of the edges and surface of these rocks, the coarse rock-sand near the rocks, and its gradual increase of fineness as you get farther off, until it becomes extremely fine and light in texture, and of color characteristic of the rock—are circumstances which carry conviction to the mind at once—and will dispel the vulgar notion that all "stones and rocks grow like potatoes."

Then, according to the Mosaic account, the earth must have been, *primarily*, covered with water, (if not held in solution,) and after a place of retreat had been prepared, its rapid retirement may have fretted off and carried away the softer parts of the ground, in such a manner as to form the cuts and gashes and depressions which we see, and which puzzle our understandings to account for. But, we have proof positive, that this theory is not alone sufficient. Whence come the immense deposits of fossil shells, and marine appearances to be found in the bottoms of the streams and swamps, remote from salt water; in the ravines on the precipitous hill-sides, and by

borings of over one hundred feet below the surface of the highest plains or promontories? Not only great varieties of shells are found, but the teeth and bones of the largest inhabitants of the deep.

Then, the history of the *creation* will not account, to a rational mind, for all the appearances to which I allude. But Moses tells us of the *flood*, which God said he brought "upon the earth to destroy all *flesh* wherein is the *breath* of life, from under Heaven: and every thing that is in the earth shall die." In this account I see no mention made of the *fishes* and other oceanic inhabitants. But rejecting the idea, that God *created* them in the *waters* of good kind, and threw aside, *under* the earth, vast masses of their bones and shells or rather the fragments of his workmanship with which he was not "well pleased"—throwing aside every speculation relative to the *creation*, let us take the history of the flood, and it will help our minds to some conclusion.

After Noah had entered the Ark, accompanied by his chosen stock for repeopling and reanimating the earth with all that had before moved or breathed upon it or in it, "it came to pass, after seven days that the waters of the flood were upon the earth." In the 600th year of Noah's life, the 2nd month, the 17th day—the *same day* were all "the fountains of the *great deep* broken up, and the windows of heaven were opened"—"and the waters prevailed, and were increased greatly upon the earth"—"and the waters prevailed exceedingly upon the earth; and all the *hills* that were under the whole heaven were covered." "Fifteen cubits upwards did the waters prevail and the mountains were covered"—"and the waters prevailed upon the earth *one hundred and fifty days*." "God made a *wind* to pass over the earth, and the waters assuaged." "The fountains also of the deep and the windows of heaven were stopped, and the rain from heaven was restrained." "And the waters returned from off the earth continually, and *after* the end of the 150 days the waters were abated." May we understand this *abatement* to mean, that the waters ceased to lash, and foam, and roll in mountain waves? The word *abated* can here have no other intelligible meaning: for, the Ark only "rested on the *seventh* month on the 17th day of the month, upon the mountains of Ararat." That is precisely *five* months after "the fountains of the *great deep* were broken up, and the windows of heaven were opened." But after the Ark had sat down on Ararat, "the waters decreased continually, until the *tenth* month: in the *tenth* month, on the first day of the month, were the *tops* of the mountains seen." Reference to the account will tell the reader *how long* it was before Noah and his charge disembarked from the Ark. And, reasoning from what little we know, may we not suppose that the agitated waters of such a devouring flood, must have changed the appearance and form of all that had been heretofore dry land, except perhaps, the huge primitive mountains? Ararat, resisted the billows. It would seem that the bed of the ocean, the principal residence of the shelled tribe, was scooped and heaved up, and carried by the waves to great distances; even to the tops of the Andes, where marine appearances are to be found, as well as upon the highest mountains of other countries. We hear of no remains upon these extreme heights, of the larger inhabi-

tants of the deep; and, from the account of the deluge, we may well comprehend how lighter matters may have been buffeted to such an elevation, and left there by the retiring waters.

We may call the whole country below the granite ledge of rocks, *secondary* in its formation. Whether it was dry or was covered by water before the flood, is immaterial to this view of the subject. In either case, our eyes tell us, that the surface has been greatly raised; not by convulsive heavings, nor by volcanic eruptions, but by intermitting agitations of the ocean. May we not suppose that during the long continuance of the flood, the ordinary causes for the tides still were unsuspended; that the winds remained the same, and that there were necessarily, a tremendous roaring, rocking and upturning of the billows of an ocean, which the great "*Jealous*" in all his vengeance had raised fifteen cubits above the highest dry land! What then must have been the changes of the position of every thing which these waters could move or rend asunder! The shelled tribe must have been tossed about and deposited in the places we find them, under the influence of the winds, the tides, and the currents, created in part, probably, by the peculiar original formation of the inundated land. We find these shells in the valleys and on the precipitous hill-sides. But on the hill-sides they are like the other strata, above and below them, uniform in their dip, and undulating with the eminence over which they appear to have been spread. Here we see a stratum of red, here of blue, and there of yellow or white clay; sometimes without sand, but generally mixed with it. In the same deep boring or cut, we frequently find occasional layers of every variety of earth; of pure sand, both red and white. And it often happens, that at different depths, strata of flint stones and pebbles, rounded and polished by attrition, are found with the interstices filled either with pure sand or a mixture of sand and clay, either red or white. High mounds and promontories are often met with, composed chiefly of these gravel deposits.

From all these appearances, the mind is irresistibly led to the conclusion, that the ocean once covered, (and for some time) in a state of great agitation, the whole of Virginia, and I may say, of the United States, for some miles at least, above the present head of tide-water. And can an inquiring mind fail to ask, were not these various strata deposited as we see them, at *different* periods? Could there have been more than one general deluge? If there has been no other than that described by Moses, is it not probable, that the tides, winds and tornadoes that must have happened during the prevalence of the water on the earth, may have varied in violence, so as to leave distinct and characteristic deposits? That this was the case, is indicated by the fact that strata of gravel are found, (within ten feet) with one of sand above, and one below them. We know the effects of high tides, freshets, tempests and storms in our day—how they transport lands, and houses, and trees and rocks; but how awfully different was the deluge of an enraged God!

But it is in vain for finite minds to attempt to unravel the mysteries in the skein of created things. We can only reason from analogy. We see the causes which create new, and fill up the old beds of our streams—which gradually carry

away islands; add to old, and form new ones. Some may think they know the cause of the changes in our climate, and the gradual diminution of the waters of our fountains and rivers: but they cannot agree among themselves about it. Why is it that the tide rises at Cumberland, in the Bay of Fundy, to the great height of *seventy-one feet*, and only nine, at Cape Sable—six and a half at Cape Cod, twenty-five at the mouth of Passamaquoddy river, ten at Penobscot, eight at Halifax (Nova Scotia,) five at New York, four and a half at Cape Henry, five at Norfolk, and but one and a half at the mouths of the Mississippi? But enough of this digression.

G.

From the Cultivator.

WINTERING SHEEP.

In December flocks of sheep require a little of our time and attention; if these are bestowed with subsequent ordinary care, sheep will commonly pass through the winter with trifling loss and much to our advantage. For want of attention in the commencement of winter I have seen large flocks nearly lost during its course, which might have been saved with a little previous care. But when it did occur you could not convince their owners that it was their bad management, as they had made up their minds to impute it solely to their *bad luck*. It is always the best policy for the farmer to have his sheep in good condition when they begin the winter, and then they are sure to go well through it. If however they are permitted to enter it poor and light—good provender and a regular supply of it, which is the best that can then be done, although it may save the lives of some, will not carry them prosperously through it. The foundation of our loss of sheep in winter is laid during the season of pasturing, for the experience of every farmer will teach him that only give them enough to eat during the summer, the natural effect will be that they will put on flesh; and a sheep in good condition is easily and safely wintered, whilst it is a most difficult job to carry a poor sheep safe through the winter. It is wrong to permit them to ramble over the fields later than about the first of December, because at that time there is little nutriment in the scanty herbage on which they feed, and the blades of grass had better remain on the stem to protect it during the frosts and winds of winter, and prepare it for an early and vigorous growth in the spring; besides, as the supply to the animal is small, and innutritious, there is great danger that there will be a falling off in its flesh, which it can ill spare, and which to its subsequent existence it is so necessary it should now retain. I have frequently thought that an open December, which is often wished for by the farmer to save his winter supply of hay, is more prejudicial to his sheep, when they ramble over the fields, and to his own interest, than he is generally aware of. It would certainly comport more with real economy, if he were to bring up his sheep by the 10th, or at farthest the 15th of this month, into winter quarters, even if the weather should remain warm and the ground uncovered; for if they lose flesh at this time, they cannot regain it until spring, and the mortality which

sometimes costs almost entire flocks is imputable in a measure to this cause.

Sheep in winter should have sheds; the preservation of their health requires this indulgence, and nature prompts to it. Let me ask, if they have the choice, do they remain in the open air in a storm? No, they as instinctively run to their covering as a man does to his house, and if they do not require it quite as much, they appear quite as well for the shelter. For a flock of poor sheep a protection from the weather is all important. Those in good condition do not as much want it, as they have a better coat both of flesh and wool; but for them it is likewise useful, and a good farmer will not omit to give all the requisite shelter. In those countries in Europe which grow large quantities of the finest wool, they find it indispensable to the attainment of their object, that is fine wool, that their sheep are sheltered from storms both summer and winter, and they have made their arrangements accordingly, for they herd them every night and narrowly watch the indications of the weather during the day. They say that rain and snow give a hardness and coarseness to the wool which they can obviate by a sufficiency of shelter. But to our subject: as soon as sheep are brought into the yard for winter, the different kinds of lambs, ewes, and wethers should be carefully separated and kept apart. It is important that those in one yard should be as nearly of a size as practicable; for by being so, there are no strong ones among them, to drive the weaker from their provender. All will then feed alike and do well. The flocks ought likewise to be as small as we can conveniently make them. It is an invariable rule that a small flock does much better than a large one, even if both, according to their number, are fed equally well. If the flocks in each yard can be reduced to between fifty and one hundred, so much the better; and it is a great desideratum to make them as few as fifty if it can in any way be effected. It is also necessary to have a separate yard for old and poor sheep, and if there are any in the flock that do not subsequently do well they should be removed into what is commonly called the hospital. These hospital sheep, by being few in number, having a good warm shed, a sheaf of oats, or a few screenings from under the fanning mill, once a day, will soon begin to improve. I have had my hospital sheep in a better condition with this care by spring than any other flock, and I must say that for the last three seasons, my sheep were in better condition when I turned them out of my yards in the spring, than when I put them there in the beginning of winter. Sheep ought to be rather sparingly than sumptuously fed, three times a day, and out of racks, to prevent them from running over and trampling on the hay. As soon as one is seen in any of the flocks to become thin, it ought to be removed at once into the hospital where it will be better fed. If you neglect to do this it will soon be too late, and you will suffer loss; for a sheep once reduced to a certain point cannot be recovered. It is of service to give them a feeding of straw, or pine tops, if you please; for it invigorates their health and makes a change in their food. They ought all to be daily watered, and if your hay has not been salted, to have a lick of salt occasionally. The opinion that sheep do not want water is erroneous; repeated observation has convinced me that

it is almost as indispensable to their welfare as their food, and the sooner farmers get rid of this notion the better for both their interests and understanding. I have tried the experiment of keeping sheep without water in conformity with this improper custom so often and thoroughly, that I have come to the conclusion that the only safe rule is the opposite one. I could repeat the several occasions when I have acted upon this plan for my own information, were it necessary, but I only add that the result in my hands was invariable, that is, my sheep grew thin, as it was, that they immediately improved when I adopted an opposite practice. With this care you will save all your sheep; or not lose more of them than you would of the same number of horses and cattle. They will have no disease among them. I have often thought of an observation, made to me by an experienced wool-grower from whom I once asked for information of the diseases of sheep; he answered, "what have you to do with the diseases of sheep? take care of them and you will have no need for remedies." This observation struck me as strange at the time, but subsequent experience has amply confirmed it. And now, what will the farmer gain by keeping his sheep well? In the first place, he will save his hay, a fat sheep will not eat so much as a poor one; he will save all his grain—sheep in good condition do not require any. In the next place, he will save all his sheep—he will have more and better lambs in the spring, besides several ounces more of wool to each sheep; and what is better than all the rest, he will in the end save himself loss and anxiety. The saving will at least be from one-eighth to one-fourth of the value of his flock, and all this by attending to a necessary work in due season.

A.

TRIAL OF MR. HERBEMONT'S WINE.

[We regret that the accidents mentioned below should have prevented an examination of all the wine. In addition to this decision, we had before heard expressed, by Gideon B. Smith, Esq. formerly editor of the *American Farmer*, praise equally strong, and more fully stated, of the fine flavor of Mr. Herbemont's Champagne wine.]

To the Editor of the *Farmers' Register*.

Nelson Co., Feb. 16th, 1835.

By a series of accidents the several specimens of Mr. Herbemont's wine failed to reach me at the time (and those of one kind in the condition) which I expected, which has prevented my writing heretofore. Having, as I mentioned to you before, but little pretensions myself to connoisseurship in such matters I submitted the first (the Champagne) to the judgement of a friend whose opportunities and observation qualified him to speak understandingly—and my natural taste concurred with his more cultivated, in pronouncing it the best specimen of American wine we had ever seen. It seems to differ from the most acceptable imported of the same kind in nothing, except its being still, instead of sparkling.

Unluckily one of the bottles of "Port" was broken, and the cork of the other was loosened—which so impaired its flavor as to forbid the expression of opinion as to its merits. The third

kind having been sent in a different direction, I did not see it until the last month, when several gentlemen partook of it. It was thought at the time to resemble in most of its properties, the "Madeira" generally consumed in this country, except perhaps that it had less body and but little of the saccharine taste. This may arise from its having, as I learn, no addition of spirit, and but little of the second ingredient being necessary for its preservation when it is not subjected to the trial of a voyage.

These three kinds of wine, were all made, as I understand, by a variation of the process, from one species of grape (Herbemont's Madeira) until lately supposed to be a native: and together with other successful specimens, should suffice to remove every doubt as to the adaptation of our climate and soil to this species of culture.

N. F. CABELL.

EXTRACTS FROM PRIVATE CORRESPONDENCE.

FENCE LAW AND TAX—COLD WEATHER.

Nottoway, December 15th, 1834.

The petition to the legislature for a change in the fence law will take well here. There is very little objection, and amongst the intelligent, almost none. The thing was started rather too late for this session, though I should like to see it discussed, as it would thereby set the public mind in operation, which is all that is necessary. If it could be effected in five years, western migration would be checked, because our lands could be made rich, and the cultivation profitable.

Columbia, S. C., February 10th, 1835.

* * * We have had these four days the coldest weather I have ever felt here. The thermometer was on Sunday (the 8th) two degrees below zero, a degree of cold unknown here before, at least for a great number of years. It is to-day 10 degrees above 0. * * *

February 12th, 1835.

The most important subject to farmers now, is the proposed change in our fence law. I hope you will not let that subject sleep, as I am well convinced, more important interests are connected with it, than with any of the absorbing political questions of the day. By way of illustrating the excessive expenses attendant on the present law of enclosures, I would barely state a fact in regard to my own plantation. I have 1500 acres of land, on which I have (of necessity) fourteen miles of fence, (one-third of which is distant from my supply of timber an average of two miles) one mile and a half of which is on a stream very liable to inundation, and is, in fact, carried off at least once in two years. Now the whole fencing I would require, in case of the proposed change of the law, to protect my arable land, or rather to keep in my own stock, would not exceed three miles, and that convenient to timber. Mine is by no means an unusually strong case; there are many within my own knowledge equally oppressive, and yet demagogue-ism is resisting our efforts at relief from this most unjust and distressing tax. The thing is, however, gaining ground, and your paper is a powerful agent in the work.

THE FARMERS' REGISTER.

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APRIL, 1835.

No. 41.

EDMUND RUFFIN, EDITOR AND PROPRIETOR.

CHICKAHOMONY SWAMP LANDS—BLUE GRASS
AND HERDS GRASS MEADOWS—GRASS HUSBANDRY.

To the Editor of the Farmers' Register.

Henrico, February, 1835.

All the streams in this whole region of the state, large enough to turn a grist mill, are bordered by low grounds or alluvial flats; varying in width, nearly in proportion to their length. There is much difference also, in their soil, for that partakes much of the color and character of the lands through which the upper parts of the streams and their tributaries pass. The Chickahomony, for instance, rises in the "livery," slashy lands of Hanover and Henrico; and its low grounds are generally stiff, with a considerable portion of white and party colored clay. Above the New Kent line they are comparatively narrow, and more diversified in appearance—subject to inundation, and producing a remarkably thick and tall growth of gum, ash, maple, elm, white-oak, willow oak, and many other trees of the climate. The growth depends, however, very much on the liability of the spot to water. A large proportion, (and that much the most valuable,) of these bottoms are yet to clear; and will probably remain a long time unreclaimed, as they are subject to be often under water; and when the water is off, remain too wet for almost any agricultural purpose, until the heat of the summer has evaporated the moisture. The river is narrow, very devious in its course; with low banks. Indeed it is evident, that it has frequently changed its bed. Some years ago a law was passed, granting a lottery to raise the means of straightening and clearing out this river; but owing to some defects in its details, or some other cause, the act remains, like many others, a dead letter on the statute book. Individuals have deepened and widened the old bed, for some miles, with evident benefit. The water does not overflow to the same extent, nor remain so long as formerly; and the bed is washing deeper annually, and injuriously, for the present, to the lands below, where this operation has not been performed.

There seems to be fall enough, quite to the head of tide-water, to take off the freshets, if a vent sufficient in width and depth, were made. If the land owners were to unite with proper harmony and determination, this object might be easily effected, and its benefits would compensate the expense, more than an hundred-fold. Sixty thousand acres of land at the least calculation, would be rapidly thrown into the most profitable tillage. This could not fail to be the result, as the soil is exceedingly fertile, producing enormous crops of hay, and within a few miles of Richmond. Almost an incredible number of the trunks and branches of huge trees, the growth of past ages, lie to and fro, either entirely rotten, or fast decaying in the water and mud; giving out with the annual contributions of vegetable matter, noxious malaria! What could be more conducive to the health of the surrounding country, than the

removal of these, along with the dense stifling growth, through which a ray of summer's sun scarcely ever penetrates?

The particular part of the valley of this river to which I allude, is about fifteen miles long, averaging, say, one and a half miles in width, excluding the bottoms of several tributary streams. Although the general character of the soil, is as stated; yet it varies exceedingly. The lands nearest the main run, and in depressed places farther off, are denominated *mud lands*. They are different in color, but all rich: being composed of the washings from the highlands above, the red, the yellow, the blue, and the white clays found on the hill-sides, and in the bottoms of the tributary branches and ravines. Independent of the supply of top soil and vegetable matter furnished by freshets, the accumulation of the last ingredient, from the growth of the land for centuries, must have been sufficient to fertilize it. The brown and chocolate colored mud land is better than the gray and ash colored; being more friable, or containing sand in a coarser form. The latter is apt to bake and to crack open when dry—neither freely absorbing nor giving out moisture. Virgin cakes of it when broken, show thin strata of different appearances, which would seem to indicate the tardy process of its formation. They are very productive in corn when the season is not too wet; but that is too generally the case, in the present condition of the swamp. Nor is it safe to seed them in wheat; for it will be winter killed; and if it were not, would be sure to grow too rank and fall, or take the rust. I know of but few instances of the success of this grain on these lands. It has succeeded pretty well with several farmers on lands somewhat of this character; but only after they had been well reclaimed, and tended sometime in corn. Oats do rather better; though unless sown quite late, they are liable to fall. The most congenial crop seems to be herds grass. When the ground is well prepared and properly seeded, the crop will range from six to eight thousand pounds of cured hay. Timothy succeeds well. The objection to it is, that it fires or burns up, in this hot climate, and will not, like herds grass, wait for the farmer.

A grass has spontaneously sprung up in these lands, and been propagated by several persons, who esteem it highly. They call it the blue grass, from its rich glossy blue appearance, both while growing, and after cured into hay. It rises from three to five feet; stem nearly flat, and about the size of a goose quill; leaves numerous from top to bottom of the stem, and from six to twelve inches long, half an inch wide near the boot, smooth and tapering. It puts forth a thread-like flower stem out of the boot of every leaf, which rises and branches off like the head of the oat, bearing numerous small seed. This flower is of a richer purple than the leaf or stem. I do not know its botanical name, and if I did, it is probable that this plain description would suit my purpose in describing it, even better. I am highly pleased with it, because it is said to delight in wet land, conquers every thing else, even the bullrush

and the broom sedge. All the Chickahomony lands, rich and poor, dry and wet, put up the sedge very soon after the most careful preparation. Meadows as thickly set in herds grass, as the teeth in a card, become entirely overrun with it in a few years (say six) and require a hoe crop and re-seeding. We all know what a pest the bullrush is! The blue grass makes coarse looking hay, though stock are very fond of it, and seem to eat the stem, as though they relished it as well as the blades. Never having cultivated it, I know nothing of a supposed difficulty in curing it, owing to the size of the stem. Yet I can conceive, that laying more open in the swath, as well as in the slock, the air would find a more free circulation through it, and enable you to stack it as soon as fine grass. Every body knows, I presume, that air-cured hay is better than that cured by the heat of the sun.

Another portion of these bottoms, rather more elevated than the mud lands, is ash colored, stiff, liable to bake, and retentive of water. The crops are apt to be very light either in wet or dry seasons. Should the elements be favorable, and the owner very industrious in keeping it clean and finely pulverized, it pays pretty well in corn. But it might do better in grass or pasture. It is generally speaking less valuable than highland—and there is much of it in this valley. Putrescent manure will act favorably, but for a short time. The pewtery mass soon runs together after being lightened, pulverized and manured. Nothing but very coarse sand or coal ashes will change its stubborn nature. The latter makes it rich.

Nearer the hills, and wherever the land is free from inundation, and not so retentive of water, the soil is light and friable; and frequently has an excess of sand. All of this on both sides of the swamp, has been cleared, by former generations. If we judge by its present crops, it must have been originally rich. Below the New Kent line the low grounds grow gradually wider, the soil lighter and more sandy. Of that part of the valley I know nothing.

Perhaps the flats on no stream in the state, present such diversities of soil as those of the Chickahomony—nor are they, any where, so irregularly dispersed. And the fields in many places, have been cleared in a corresponding manner. When the sluggish run (for it is not a river,) shall be well opened and straightened, and the superabundant water conducted off, these inequalities in the productiveness and the value of these lands will be lessened—a stimulus will be offered to the owners to clean up and drain all the low wet spots, now grown up and disfiguring their farms—the rich virgin land, now useless, except for timber and fuel, will be cleared and cultivated, yielding great profit, and furnishing the means of enriching the exhausted highlands. When the whole of this extensive valley shall be brought into neat cultivation; interspersed with verdant meadows, green fields of corn and ripening harvests, what a beautiful spectacle will it be from the lofty heights, to the eye of the metropolitan! From the centre of the city he may reach and enjoy it in half an hour's ride.

This, for the present, is indeed a fancy picture. But when Richmond shall contain a population of sixty or seventy thousand, and its commercial capital be trebled and profitably employed, the

demands of its markets, aided by some of its enterprise and money, will convert this fancy into reality. I have at hand, no means to ascertain how many thousand bundles of northern hay, are annually sold in Richmond. The quantity is very great, considering the population. That article alone, will justify the reclaiming of the lands on the Chickahomony! One acre adapted to meadow, and cultivated in the best manner, will not fail to make six thousand weight; which at seventy five cents, (the lowest regular market price, for the best hay,) amounts to \$45. Deduct \$10 for cutting, curing and hauling to market, and you have a clear income of \$35. Now what is that acre of land worth, which pays interest on \$583?

Not more than one-fourth of this bottom is, however, capable of this production, and then only, after much pains and expense in preparation and seeding—more indeed than its present cultivators have bestowed. It must be confessed that the original clearing and preparing of the soil is laborious and expensive. This is about compensated though, by the value of the wood and timber, except where the wood is too distant to bear carriage to market. It is my opinion that about one-half of the whole body of low grounds (within the limits alluded to) is capable of producing three thousand weight of hay per acre; perhaps it would average four; while the richest would yield about 8500. Only one crop of artificial grass is cut annually—the second crop has no chance to grow until the fall rains and mild temperature commence; for the first is mowed just at the commencement of hot weather.

Considerable quantities of hay are made from wild grass which springs up abundantly in land that is wet. It is quite coarse, but yields two crops generally; and especially, when the first is cut early. It finds a market at fifty cents, and sixty two and a half cents. Some of it is pretty good. It seems to suit particular tavern keepers and keepers of livery stables; whether on account of the price, or of the certainty that horses are not so fond of it, or from both these considerations together, I do not undertake to say.

The blue grass yields also two crops—both of which put together, perhaps are greater than the best single crop of artificial grass. It, like the herds grass, will wait a week or two for the mower—and I am disposed to think, it will take the place of all other grasses on lands adapted to it. In fact it is rapidly springing up in meadows where it never was sown, and quite remote from those in which it is cultivated or encouraged to grow. Orchard grass does not succeed, but the feather grass grows luxuriantly, though I think the hay light and chaffy, (to use that expression.) A mixture of timothy and herds grass, seems to me, to be well calculated for all the artificial meadows in the lower country. The latter, when ready to be cut, is apt to fall, and would be greatly sustained by the stouter and stiffer stalk of the former, which in its turn would be less liable to burn or dry up, when shaded and protected, as it would be. In three or four years the timothy will be rooted out by the herds grass, and in this climate, the best meadow will not last more than six or seven years and be profitable.

It may be well to say something about the mode of preparing and seeding an artificial meadow; and what I shall say on these subjects will be

equally applicable to the whole of the country below the mountains. There is scarcely a stream in this whole region that does not afford some excellent meadow land; and there are numerous wet slashy spots, in the levels of the highlands that would produce fine crops of hay. Lower Virginia, though almost exclusively a grain growing country, is often, and particularly in some parts of it, very deficient in rough or long food for stock. Fodder (or corn blades) is the main dependence for sheep and horses; and shucks and straw for cattle. I have long thought that blade fodder was not worth half the cost of gathering and saving it; unless the corn be remarkably fine. And even from such corn, the weather must be very favorable to secure it with its nutritive juices. If I had no meadow, nor knowledge of hay, I might think otherwise. (This is a plain matter that ought to be fully discussed and experimented upon.)

Land for a meadow ought to be rich and moist; or at any rate, retentive of moisture until the middle of June. The soil must be ploughed and harrowed until finely divided. The aid of a roller will in many cases, greatly facilitate this operation. But it ought to be complete, and the land made as level as possible, in order to lighten the labor of the mower, and enable him to get the whole crop of grass. The depth of the first ploughing should be regulated by the depth of the fertile soil. Deep stirring of the earth is necessary; for the deeper it be broken, the more moisture it will absorb, and the more it will give to the roots of the grass. All the roots, trash and tussocks must be carried off—they are the nurseries of weeds, and will be in other respects injurious.

The seed ought to be sown after the last harrowing and before any rain has fallen. A bushel of herds, and one gallon of timothy seed, or rather less will be sufficient per acre, if sown in September, or before the middle of October. If sown in the spring or summer, half a bushel more of herds ought to be added. But there is no danger of sowing too many seed; and I should never stop under two bushels, provided the seed were not too costly. Though what is a little expense, compared to a thick luxuriant crop, which shall entirely possess the ground, to the exclusion of every other growth? Grass when sown too thick, will (and only on rich land) thin itself exactly to that point which insures fineness and the greatest production of which the soil and climate are capable. Many grass growers have labored under a strange delusion on this subject. It was the practice with some (of my acquaintance,) to sow only one peck on an acre. The consequence was, that they had to lose one year, waiting for the grass to spread, and supply the stinted seeding—cutting the first year a rank crop of weeds, mixed so sparingly with hay, that the produce was but of little value, except as horse bedding. The cutting of such a crop is heavier work than of good hay. And experience proves, that thinly sown meadows will always remain foul, and give inferior crops.

The seeds having been thoroughly mixed together with the hand, are then sown in a dry state, by the hand also after the manner of small grain; the ground having been first marked off into six feet lands by using a hoe or rake handle. Horses ought not to go on the ground thus prepared; and if the lies laid off, as recommended,

be not mathematically straight, they will sufficiently guide the seedsman, who ought to follow just behind the operator, and while his mark is fresh. This will insure regularity. The sower's hand ought to be held low, and particularly if there be any wind. It is better to sow the seed dry, because then they separate easily, and fall more regularly. Being white, they ought to give the ground an evenly powdered appearance, which is the only sure proof of good sowing, excepting always the appearance of the grass itself—and slighted spots should be resown by both of these indices. Herds grass seed are so small and light, that they are very apt to be taken up and thrown about and deposited in sunken places, if not carried off by the winds. To prevent this, the roller should follow the seedsman as soon as possible. In addition to this benefit, it beautifully levels and smooths such finely prepared ground, and leaves it, so that the grass knife passes over it without obstruction or jar.

How interesting to the eye of the husbandman, is such a plot of land, thickly and evenly covered with a rich coat of grass, in full bloom! Then is the time to apply the knife, and handle the fork. An experienced and dexterous cutter will be enabled to shear it smoothly and evenly, and with as much apparent ease as the city barber wields the instrument of his vocation.

The second crop, as already suggested, does not rise high enough in this climate to be cut. But it affords the best of grazing. In its growth it steals along, alternately freshened up by showers, dews, and cool nights; and parched and withered by the burning sun of summer, until released from this doubtful state of existence, by the more regular and genial temperature of September. Not till then, does it assume its gay verdure, and give promise of future vigor and value. A certain union of heat and moisture is necessary to every sort of vegetation, and every clime is characterized by its peculiar productions. In the temperate zone, we regard spring as the flood, and winter as the ebb-tide of vegetable life. Summer and autumn are the seasons of their vigor and maturity. But it is both interesting and instructive to note the effect produced by the removal of plants from one latitude to another, within our zone. Some of the artificial grasses so called, which preserve their verdure, in the northern states, and even beyond our mountains, during the whole summer, die and are withered to the very ground, by the heat of the sun in the lower and southern country. To them autumn is a second day of resurrection. Hence they yield us but one crop of hay, and seem to be incapable of that degree of acclimation that would enable them to produce two, notwithstanding all our care. We have vainly endeavored to nurse into usefulness, the *guinea grass*, which has been pronounced to be to the West Indies "the next great blessing to the sugar cane." These considerations make it desirable that some native grass should take the place of exotics. The blue grass promises to do this on very rich and wet lands; but a little more experience with it ought to be had before we give up the herds grass, which we know to be valuable either on the wettest or the driest land.

Unless the second crop, or aftermath, be grazed down, it dies in the winter, and forms a thick covering of dead material that retards the early

growth of the spring crop, impedes the mower, and injuriously mixes with the hay of the next crop, as it must be cut with it. On a new meadow, this covering in favorable seasons, will rot after the grass rises over it in the spring—but this is not often the case. It has been the practice, with many farmers, to burn it off early in the spring. The objection to that, is the probability of impoverishing the soil. But on the other hand, such heavy grazing as will be necessary to consume and trample it completely down, is attended with the pernicious effect of poaching, or making the ground too hard; and when that is the case, the crop becomes short and meager. When the ground is dry, grazing may be permitted, though never in wet weather, or when the hoof breaks, or much indents the sod. At the time, however, when the grazing of meadows, in this climate, would be most profitable, grass is abundant enough in the fields. The plan of a standing pasture, with an occasional use of the meadow in the fall, would seem most advisable. Still I am inclined to think, that burning once in three years, would be more beneficial than injurious.

Although the months of September and October are the best for sowing grass seeds, it may be done, in my opinion, any month in the year, provided there be no danger of the waters covering the land and removing the seed. When sown in the spring or summer, or too late in the fall for them to vegetate, the first crop will be more or less mixed with weeds. I sowed a few acres some years ago, with oats. The grass came up remarkably well. After the oats were cut, we had very dry and warm weather. I examined the fate of the grass, and found that before the heavy crop of weeds, which succeeded the oats, had protected it, the young grass had been completely killed. It had risen two or three inches; and though sown very thick, appeared to be entirely destroyed. The ground was as dry as it could be, and I could see no sign of life in the roots. This soil when moist, is as black as lamp-black; light, and contains much sand. Notwithstanding these appearances, the grass put up slowly in the fall, and in the spring, occupied the ground, to the exclusion of every thing else. The crop of hay was a good one, though much injured by the stalks of the weeds that ought to have been cut off in the fall.

Excuse the digressions and diversities of this long letter. They are characteristic of my mode of thinking. The subject is but only broached. For the present, let this suffice. I had intended giving you a topographical and agricultural delineation of the country from the James to the Potomac River. May I not call upon the strong pens and intelligent minds in the several intervening counties to aid in this work?

C. W. GOOCH.

For the Farmers' Register.

DESULTORY OBSERVATIONS ON THE SOILS AND AGRICULTURE OF HENRICO COUNTY.

The lands in the county of Henrico vary probably, more than in any other county. Those of the Chickahomony bottoms have been described [page 649.] The hills that overlook these, are higher and more precipitous on the Henrico, than

on the Hanover side, and abound more in gravel and clay. Some of them are quite steep and gashed by very deep ravines, in the bottoms of some of which, opposite to Richmond, deposits of fossil shells have been found, consisting of clam, scallop, oyster, and a great variety of smaller shells; so far decomposed that they may be reduced by the pressure of the hand, and when exposed to the atmosphere, fall into powder in a few days. Expecting that these deposits will be examined by the ardent and skilful Professor Rogers, I shall say nothing more about them, except that they have not been found in many places; and but few experiments have been made with them, as manure.

The soil of these hills is diversified. In some places sandy, in others gravelly, with an admixture either of yellow clay or yellow sand; and then again, for a mile, on those the soil is a rich, chocolate colored fertile mould. There is but little red clay, but frequent hills of yellow or light brown clay. The writer has found all these varieties to be powerfully acted upon by plaster, and especially when applied to clover.

Between the Chickahomony and the James River hills, the country is generally flat, but often broken by deep ravines and valleys, along which the branches pass to either stream. Several streaks or patches of red land, not unlike the soil of the South West Mountains occur. They are however, far from being as rich; yet are susceptible of high improvement. They suffer greatly from drought. There are similar portions, with a gray or ash colored soil, of nine or ten inches thickness, resting on a red clay foundation. The soil of these portions suffers less from drought, retains manure longer, and seems to have been originally surer in production, if not actually so rich. The top soil abounds in silex in a fine form, and I presume, had in its virgin state, a due proportion of vegetable matter. But shallow ploughing, a hot sun, and close grazing, have brought these portions to poverty, and made them the favorite spots for the poverty, or hen's grass. The clay from below, after being exposed to the frost and scattered and mixed with the silicious soil above, seems to be in some places almost as good, and I think has a more permanent effect than barn-yard manure. To dig up, prepare, and scatter this red clay, would be very expensive, though less so, than the raising and use of putrescent manure. This operation might be effected by the plough, but then without a good coat of vegetation to turn under in its green state, sterility would be the consequence for a year or two. Indeed the plough cannot be easily made to reach the red substratum and throw it up uniformly, without running a two-horse, directly in the furrow after a three-horse plough and few persons are disposed to incur this expense. There is a great deal of this sort of land in Virginia. If a sufficient crop of clover cannot be made to grow on it by Mr. Sampson's mode of lightly top-dressing small grain, at, or just before the time of sowing clover seed, a crop of peas, buckwheat or rye, might be turned under in a green state, by a double ploughing, as suggested. But from the experiments I have made, winter grain neatly put in and top-dressed with farm-yard manure succeeds well. The manure seems to be more beneficial in this, than in any other mode of applying it, and secures to a certainty a good crop

of clover. The improvers of exhausted land in every part of the state consider their work nearly accomplished as soon as they can get it well covered with red clover. Good ploughing, a proper rotation of crops, and non-grazing, with the use of plaster, have seldom in such cases, failed to restore the soil to its original fertility. To go beyond that, requires calcareous matter or heavy dressings of putrescent vegetable or animal manures. I have an old field of this sort of land that put up, when I took possession of it, nothing but hen's grass. The soil was originally very good; but it had been worn down to the lowest point of sterility. From the very promising appearance of the substratum, I thought that it could be renovated by good ploughing, and the use of plaster, so as to produce clover. It was accordingly ploughed from four to six inches deep, sown in oats, clover and orchard grass, plastered at the rate of a bushel to the acre. The oats were very inferior to what I expected, but better than anticipated by those who knew the land. They were, however, not sown until April; for I did not take possession until late in March. The clover came up very badly, and except upon some portions of the field that had been partially manured by the former owner, was an entire failure. The grass seeds sown on this field cost me \$152. Having as much rich land as I had force to cultivate, and reclaim, I determined to let this field as well as others on the same farm, rest and take the chance of gradual improvement by time, and one or two ploughings, until I could take hold of it. In 1829 the whole field was first treated as above stated. It rested two years, and in 1832 was in wheat—crop very inferior, except where my small stock of manure was put—a third of the field was not worth cutting, and was left to rot on the ground. It rested in 1833 and 1834. The visible improvement that has taken place in the appearance of the land—the thicker cover of vegetable matter including strong and bold weeds—induced me to commence ploughing in the winter, to put it in corn this year, to be manured in the hill, with farm-pen manure, ashes, plaster, &c. It has been unavoidably pastured, but not heavily during the years of rest. If, in 1829, the plaster had been sown before fallowing, or just before the harrow that put in the oats, the improvement would, in my opinion, have been greater.

About twenty acres of this field have been kept under a different system, both for convenience and experiment—divided into two plots. No. 1. was the richest part of the field, as it had been manured slightly by my predecessor—No. 2. was quite as poor as the average of the whole.

- Plot No. 1. 1829. In oats clovered and plastered—crop a fair one, equal to average in the neighborhood.
- “ “ 1830. Clover—cut most of it—very irregular in growth from uneven manuring formerly.
- “ “ 1831. Clover—pastured by calves, &c.—greatly depreciated.
- “ “ 1832. Manured before the plough and put in wheat with rest of the field—crop excellent—though still very irregular.
- “ “ 1833. Wheat again—crop more productive and not so irregular.

Plot No. 1. 1834. Rye—crop comparatively good—sown too thick—though the field, more than ten for one of seed.

Plot No. 2. 1829. Oats, clovered and plastered—crop inferior, just worth cutting.

“ “ 1830. Clover—crop inferior—cut but a few hundred weight, and that in spots.

“ “ 1831. Clover—plastered like plot No. 1—clover almost entirely disappeared.

“ “ 1832. Wheat—crop very inferior—hardly worth cutting.

“ “ 1833. Corn—lightly manured in the hill with corn-stalk and farm-pen manure—crop not measured—supposed about three barrels to the acre—and as irregular as the different parcels of manure.

“ “ 1834. Wheat, lightly top-dressed with farm-pen manure, when frozen, or there was snow on the ground—crop about ten for one.

You will observe that the plot No. 1. has been in small grain the three last years, and has been tended four years in six. The whole manuring would be about equal to one good dressing of manure: yet the crops have been quite respectable—and the clover is at this moment (23rd February) so promising, (without ever having been seeded, except in 1829,) that I intend plastering it, and exempting it from the corn crop intended for the whole field. Plot No. 2. was the poorest—has been four years in crop, and one a corn crop. Still the light top-dressing given to the last wheat crop, has caused the clover to appear (though sown in 1829,) so thick and vigorous, that, by a single plastering, I expect to make a fair crop, which will bear one cutting and keep the land improving until the whole field can be brought to the same point of improvement.

These plots have been thus managed, because they are very convenient for the employment of the idle servants about my yard, &c.; and it was easy to use the manure on them, while more important and distant operations called for the use of all the two, and four-footed force, I could command. Another reason influenced this course: these plots had become excessively foul with high-land blue grass, wire grass, running briars, &c.; and they are not half exterminated now. The plastering given the whole field in 1829 seemed to give a sort of magic existence to these pests. The running brier, or dewberry, is a great annoyance on this whole field. It is worse than the sas-safras: for that can be destroyed by cutting it down some inches above the ground with a brier knife twice in one summer, or by putting hungry animals to eat off the leaves and prevent the atmospheric elaboration of sap through the leaves, without which, plants and vegetables soon die. This brier, is not so, the plough does not go to the bottom of its root, and when cut off nine inches below the surface, it puts up three or four shoots instead of one, that will run ten feet in a season, and, with the least encouragement, take root, and propagate new nurseries. This is one of the evils of resting land, without grazing. But I believe that this

brier delights in the gray or silicious soils more than any other—and especially, if they rest on a red clay foundation, into which the roots can freely penetrate.

In reclaiming poor, worn lands, I am satisfied that the little manure we can raise and employ, had better be used as a top-dressing on small grain, in the manner recommended by that highly respectable, sensible, and practical farmer, Richard Sampson. [F'ar. Reg. vol. i. p. 58.] The manure goes much farther, used in this way; and what equally recommends the practice is, that it may be hauled daily and fresh from the stable or the farm-pen all the winter, and *until* late in the spring, provided it be broken to pieces, and scattered pretty evenly. It will not answer to spread it on hard ground; but on small grain, or ploughed land, it seems to lose nothing by evaporation. The rains dissolve the valuable qualities of the manure, when sufficiently rotted, and the ground absorbs them—leaving the fibrous parts a sort of protection on the soil—and, if not sufficiently rotted, that process will take place as soon as the agents of heat and moisture, and the shelter of the crop become sufficient. New manure, if made fine enough, will thus give to the land and the crop much of what it would lose in a complete, or even partial fermentation in the manure heap.

Of the ash colored, silicious soil of the field alluded to, I took, in 1831, one acre—manured it—ploughed it nine inches deep, just touched the red clay—it was finely divided by the harrow and other ploughings, and then cultivated in vegetables. The product was very great. I never saw finer summer turnips, (Early Dutch,) Irish potatoes, or ruta бага turnips. They were cultivated in drills; and with less trouble than corn. After the land was well ploughed &c., a two-horse plough opened furrows three feet apart. These had coarse farm-pen manure put into them, and the potato was cut into four or five pieces, rolled in plaster to absorb moisture, and prevent rotting, and dropped along on the manure and were covered by a single stroke of a one-horse plough on the furrow-side of the two-horse plough—furrow just tumbling in the ridge of the larger mould board. In the other furrows I put the potatoes, and then the manure on the top, and covered as before. Two furrows with the plough and one with the cultivator was all the tillage; the plough hilling up on both sides as it went. I saw no difference in the growth; but, while the potatoes planted on the manure were larger, dryer, and more easily dug, those planted under it were more numerous; and from not being so large might have been the most profitable crop: any difference in *quality* on the table could hardly be perceived. The ruta бага were as good and quite as large as I ever wish to make. All the other vegetables were equally fine, except some sweet potatoes that seemed disposed to run too deep into the ground to be of good size, and gave much trouble to the hand who dug them—though some were planted on hills and some in drills. The next year lot No. 1. and the whole field went into wheat. The part of the acre in ruta бага was left out, being near a new farm-pen; for at wheat seeding time these *northerners* have no idea of being cooped up in a cellar or a barn, or a huge pile in the field, and were growing finely; and I could not think of “putting them in Coventry” at the very moment when they appeared to be thriving

so well, notwithstanding the puny frosts of our fall climate, and the variable heat of the sun. They were gathered just before Christmas. Another coat of coarse manure was put, broad cast, on this slip, and it was ploughed, in some good weather in January. I did not design this apparent waste of manure; but as it had been made by the overseer, the ground was put to its highest capacity for production. It was ploughed again with a double plough, the other way—then harrowed, rolled, ploughed with the single plough, and seeded in oats at the rate of five and a half bushels to the acre—and then it was harrowed close, once each way. The product was enormous. The oats rose about three feet high, and stood so thick, that after harvest, the stubble looked thick and even, and not unlike the stubble of a rich and well mowed meadow. Some of the oats were fed away without my knowledge—the rest were thrashed out by a thrashing-machine, and measured. I will not state the number of bushels of clean oats; for I am sure it would awaken the incredulity of those who are accustomed to ten and fifteen and even thirty bushels to an acre. The same lot has been prepared and will be put in oats this spring.

These experiments show the capacity for improvement, and the productiveness of this sort of land. It is obvious, however, that under severe tillage it requires repeated manurings; for it becomes so light, that the atmosphere penetrates freely quite to the more compact substratum, and the roots of plants easily spread in every direction in search of food. It is colder and more backward than a sandy soil; yet quicker than any of the varieties of clay. Heavy rains make it miry without running together, and the top soon dries without excessive baking.

A great part of the Henrico lands are flat and *livery*, and retain the rain-water on the surface—top soil (where there is any) is ash colored, with a portion of silex in the form of impalpable powder, resting on a foundation of pipe clay. The growth is mostly whortleberry, black jack, gum, tough fibred white-oak, &c. It is very difficult to free this land of the superabundant water. The frosts and rains of winter sometimes run it together, so as to give a field a glossy, pewtery appearance. It is not productive, of course, and is difficult of improvement. Coarse sand, lime, and coal ashes, have been found very advantageous. One gentleman has drained a field of this “craw-fish land,” and by the free use of coal ashes in the first instance, and then other manures, has made it exceedingly fertile, producing heavy crops of hay, as well as of grain. His vicinity to Richmond enables him to do this at no great expense, and he is now reaping the reward of his skill and industry. The land in the vicinity of these pewtery sections, is rather better in quality, but partake very much of the same characteristics.

The James River bottoms, in the upper and lower end of the county, are rich and valuable, and are cultivated with skill and profit. Though the bottoms in the neighborhood of the Great Falls are less valuable, being more light and sandy.

The farmers in this county have greatly improved in their modes of tillage and management, within the last seven years. They make and spread more manure, use better ploughs, and sow more grass seeds, than formerly. When they

shall be convinced of the action of plaster, and adopt its free use on such lands as are adapted to it, the improvement will be more rapid. It will cost them but little, since the hauling, so very expensive to the upland farmer, will cost them nothing. Its benefit to clover, wherever that can be made to grow, if sown when the clover is four or five inches high, ought now to be conceded by every one; no matter what be the nature or locality of the land. The prejudices against this manure have arisen, in too many cases, from the vast quantities of utterly worthless gypsum that have been sold in our markets. No one can judge of its qualities when ground, without the aid of chemical tests—but in the lump, nothing is easier. Perhaps there is scarcely any difference in the value of the blue and the red. The lump should look rich and oily. The more isinglass the better. Those lumps that have a white, dry, husky appearance, are little better than so much chalk. The appointment of a vigilant inspector of plaster, might prevent the importation of the inferior article. I have found it to act more powerfully on all our gravelly knolls and hill-sides; than on any other land. I have, however, never used it to any great extent; though familiar with its use in the upper country, for twenty-five years.

The granite ledge of rocks that cause the falls in all our principal rivers, passes off from Richmond in nearly a north direction, showing itself in this county where the old stage road to Fredericksburg, crosses the Brook Run and the Chickahomony. Above this line, both free stone and granite are often found in abundance; but not below. Below, we sometimes meet with rocks of a reddish or yellow color, that appear to have gone through powerful fusion. These are not often found so numerous as to interfere with agricultural operations. The great coal field of Virginia also passes through this county a few miles, say eight, above the ledge of granite rocks; and there are several pits, that have been some time profitably worked. But these matters belong to the geologist.

Many enterprising persons have taken hold of small farms, from thirty to one hundred and fifty acres, immediately in the vicinity of Richmond, and in some instances, six or seven miles off, and have improved and beautified them very much, within the last fifteen or eighteen years. The great majority of these persons either reside in Richmond, or are engaged in business there. The changes since 1813, when I first carefully examined the country around that place, have been strikingly great. In many places, enterprising men have committed the whortleberry bushes and grubs and roots to the flames—sent the scrub pine, black jacks, and mossy gums, as wood to market—turned the frogs out of their element, and starved the craw-fish—putting in the stead of these, alternate crops of luxuriant grass and grain. Hedges and ditches, and plank enclosures, have taken the place of the old worm fences—young orchards and vineyards are beginning to yield both delight and profit—and neat cottages smile amidst the foliage of choice ornamental trees. The most of these changes are only the ground work, the commencement of what another twenty years may complete. The operators on a large scale, are more distant from the city, and have only aimed at the melioration of the soil, and the production

of the more necessary articles of comfort. But there is gradually spreading a spirit of improvement in every thing connected with horticulture and agriculture. Market gardens and dairies, those indispensable sources of good living in a city, are fast increasing and improving; and if Virginia is not to be actually given up to the occupancy of wild beasts and talking politicians, her people, every where, will bestir themselves to make the most of the great natural advantages which providence has bestowed upon them, and upon which too many of us have lived, like prodigal heirs, upon the wasting legacy of a provident parent. Virginia! yes, devoted Virginia! presented and sacrificed upon the altar of patriotism, a rich, a glorious empire. Under the same feeling, and too confident a reliance on her own virtue and power, she has permitted her veins to be opened, and for more than half a century, looked upon the outpouring of her life-blood, without efforts to stop it. She has seen almost a new world peopled by her *working* population, her youth of promise and of genius! But for the *hope of a change* for the better, in her public policy and its necessary effect on domestic interests, we should soon have seen our country thrown back far beyond any intellectual condition we have ever held. We might have retained an ignorant, oppressed mass of citizens, obedient to a few lordlings, who would do as *they please*, no matter whether their vassals approved or not. We might have offered the very best arena for hunting the fox, the deer, the bear, the panther, the wild boar. We might have eclipsed Arabia in the beauty, the fleetness and lastingness of the race horse. Yes, we might even have out voted any one of more than a dozen states in the union, and still have been flattered by mock appeals to our renown and moral influence!

But in despite of our supineness and apathy, circumstances and the march of improvement in other states, appear to be elbowing our legislature and people into motion. Some valuable channels of intercommunication have been already opened. When the Roanoke shall be finally improved—when its rich staples can, cheaply, seek a market either in Norfolk or Petersburg—when the northern extremity of the Great Valley beyond the mountains shall have the choice of the District or the Baltimore markets—when the cis and transmontane region nearest to Fredericksburg, shall have easy access to that fine town—when the great central improvement by means of the James and Roanoke shall, with its lateral branches, offer the Richmond market to the Ohio country and East Tennessee—when a line of rail roads and steam boats shall connect the extreme north with the extreme south of the union—when all these things shall occur—and *circumstances* are rapidly bringing them about—our situation will be essentially different. New life, new animation will be imparted to the whole state. Richmond already feels the spring of such a hope. Nature has designed for that place, a destiny beyond the ken of any living man. A climate as salubrious as any within our zone; alike free from the rigors of the north, or the enervating sickening heat of the south—favorably located for commerce—a great tobacco and wheat market, and within reach of immense supplies of cotton—with sufficient water power to manufacture for half the union—exhaustless beds of coal near at hand—and the nearest

port to an immense and fertile region of the west—with all these advantages what has she not to hope? The surrounding country we have seen is capable of improvement; but it depends upon that city to give it value; and as the one flourishes, so will the other.

The passage of the James River and Kenawha bill by this legislature, and the spirited operations that have commenced on the rail road to Fredericksburg, have put fresh life into many. The necessary expenditure of money, and consumption of provisions and lumber, &c., are not so stimulating as the anticipated results of these great improvements. Henrico in her horticulture and agriculture will be immensely benefited. And it is in this point of view, that I have felt justified in making this digression: and the more so, as similar benefits, though in rather less degree, will result to the whole country that trades to Richmond.

C. W. GOOCH.

Henrico, February 28th, 1835.

LUMP PLASTER—HERDS GRASS.

To the Editor of the Farmers' Register.

Louisa, Feb. 9, 1835.

Enclosed I send you five dollars to pay my second year's subscription to your valuable work, the Farmers' Register. I am much pleased with it, and wish it an extensive circulation, because I think, as far as I am able to judge, it is well calculated to excite a spirit of improvement among farmers, which is much wanted in this section of country. Some few of us are using clover and plaster, and some are talking about it. But the most of us are following the example of our forefathers in this matter. As I sometimes find it convenient to get plaster in the lump, and there being no mill in this neighborhood prepared for grinding it, you or some of your correspondents will confer a favor on me, and perhaps on others similarly situated, by informing us of the best mode of preparing it, and what effect the action of fire has upon it.

In your January number of the Farmers' Register, some inquiries are made of you by a correspondent respecting herds grass, and the due preparation of the land for it. As I have been raising it for several years, I ought to know something about it. I concluded when I saw your correspondent's inquiries, that I would save you the trouble of an answer, and state the results of my own experience upon this subject. My usual time of sowing is the fall, say from the middle of September to the middle of October, and generally get a very good crop the next year. The heat of the sun is more apt to kill it, I think, when sowed in the spring. It delights in moist, though not wet land. I would advise to keep the ditches in oozy, wet land, well opened, and their banks levelled. If they become choked up and the waters spread, the bullrush and other coarse grasses will put up and destroy the herds grass. I consider it a very valuable grass. When it is well cured, horses and other stock eat it very greedily, and colts will winter very well upon it without any grain.

My method of curing it, is to let it take sun enough after cutting to make it fall, then throw it

with pitch-forks into small ricks, and enlarge them as the hay cures. What is cut in the forenoon may be shocked up at night, opened loosely next morning, and by the evening it will generally be ready for stacking. As to the effect "*the growth of the grass, or its conversion into hay,*" will have upon the health of persons living near, I am very sure it will not be injurious.

WILLIAM SHELTON, (*Minor.*)

THE SUITABLENESS OF SHEEP HUSBANDRY FOR MIDDLE VIRGINIA.

To the Editor of the Farmers' Register.

Within the last few years, I have learned both from private sources and from agricultural journals, that northern farmers are realizing handsome profits from sheep raising. Curiosity, if not a prospect of future benefit, makes me, (and should perhaps prompt others in Virginia,) to inquire more into the subject of sheep husbandry. I do not mean an idle curiosity, Mr. Editor, but it is that wish, which I conceive every farmer should possess, to inform himself of the facts connected with every branch of rural economy. Perhaps he may turn them to useful account. To say the worst of it, the information will do him no injury. I have observed in the "Cultivator," that the farmers in New York find it more profitable to raise sheep, even on land worth one hundred dollars per acre, than to cultivate it; and that lands of less value are comparatively more profitable in that way. A question then arises, whether our own state is not as well, or better adapted to sheep husbandry, than New England. We know that a wise providence has so constituted the animal economy, that in northern latitudes, in order to their better preservation from cold, they have thicker and finer fleeces. Yet the fact, that wool answering all the purposes for the finer fabrics is raised in the south of Europe, should encourage us in the belief that this climate is at least as well adapted to that branch of husbandry as a more northern. I would next inquire whether the difference between the north and the south, as grazing countries, will present a formidable obstacle to profitable sheep raising here? I believe it is true, that lands are more fertile to the north than to the south, but I believe it is equally true that *that* is more the work of art than of nature; for I think it is conceded on all hands, that our soil is naturally more generous: but our northern brethren, (much to their credit,) have more than supplied the difference in fertility. As far as my observation has gone, wherever a system of melioration has been pursued, our lands have given every evidence that they could be made a delightful grass-growing and stock-raising country. To what extent of fertility might they not be made to attain, if the hundreds of cart loads of manure which are now spread on a few acres of tobacco land, should be returned to a larger surface. Under the present system, (I allude particularly to the tobacco growing district,) the whole farm is gleaned and impoverished, that a few acres may be enriched.

We are moreover informed in the January No. of the "Cultivator," that one of the advantages of sheep husbandry is, that the lands are improved. That sheep (contrary to all my previously formed opinions,) returns so much rich manure to the

soil, that it more than compensates for what they take from it.

If then our climate is as well adapted to the raising of fine wool—and if our soil is, or can be made with no greater expense, equally productive in grass, it appears very clear to my mind, that the profits of sheep husbandry would be fully equal, if not greater than to the north: for we possess some advantages over the north, a few of which I will name. It is no small item in the calculation, that our winters are several weeks shorter than they are in New England, and perhaps the difference in the intensity of cold, (if we are permitted to reduce it to time,) may be fairly put down as equal to several weeks more; for every farmer knows that stock require more food in cold, than in warm weather. In this way we may state the difference to be about two months in favor of Virginia—all which time the northern farmer has to provide for his stock, from which the southern farmer would be exempt. The few sheep which I keep for the use of my farm, I have never fed in winter, except when occasionally the ground is covered by snow, and so hard that they could not nuzzle through it to the clover; and I believe they are as thrifty as any flock I have known.

The cheapness of land in the south, compared with what it is to the north, will also give us some advantage here in this matter. The price of labor being lower here than to the north should also be taken into the estimate.

Those who are better acquainted with the subject of sheep husbandry, will be able perhaps, to point out many other particulars in which we possess advantages superior to our northern friends in an undertaking of this sort.

Perhaps it may be said, (and with some degree of probability too) that such inquiries are very useless, inasmuch as all our products are commanding good prices, and our farmers are in a thriving state. To which I would reply, that such may not always be their condition, and it becomes farmers to look to all the probable sources of profit, which come within their avocation, and to use them as circumstances may present themselves.

In that portion of Virginia which is, properly speaking, the tobacco-growing section, if the present price of the article should keep up a few years, there must necessarily be some change in agricultural pursuits. It requires but little observation to see that our wood land must soon be exhausted. The enormous quantity of wood necessarily consumed in curing that crop—the unnecessary felling and destruction of timber to obtain fresh land to make tobacco of certain descriptions—and the great and useless waste which the present iniquitous law of enclosures, riveted by ignorance and prejudice, imposes upon us, must soon compel some of us to seek some other mode of profitable farming. It has hitherto been an apology for tobacco culture, that there was so great a saving in transporting that crop to market, over any other. Living at the distance from market which most of its cultivators do, that it would be a serious inroad upon the profits, if they had to transport wheat, instead: and the culture of cotton is found unprofitable, beyond contradiction. Should this section of country ever abandon the cultivation of tobacco, it is probable it may be found to their interest to substitute the raising of sheep. And ma-

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ny considerations would be weighed in making the exchange. To carry to market a crop of wool which would bring a given sum of money, would probably cost less (I speak without data on which to form a correct calculation,) by nine-tenths than a crop of tobacco which would return the same sum. In the article of labor too, (though of this I am also uninformed) there must be an immense saving, perhaps not less than two-thirds. Now, sir, if I can by probability, with one-third my present number of laborers, (which would enable me to sell, or otherwise profitably dispose of the balance,) and with a saving of nine-tenths of the expense of transportation, deliver to market what will yield me as much as I at present make, is it not a subject which at least deserves further investigation?

You will perceive, Mr. Editor, that I have gone upon probabilities and conjectures, and that my object is solely to elicit inquiry—to draw out facts upon which to found calculations. Should any of our northern friends perchance see these remarks, I hope they will favor us with more information than we have hitherto possessed on this subject. Let us know how many sheep are supported on a farm of a given number of acres, of medium fertility? How much clean wool they will average through a flock? What proportion of the farm is put into cultivation, and what in pasture? Is their pasture-ground frequently changed for purposes of health? How many laborers are necessary to a flock of a given number? How much and what kind of food is given them per diem? Are they put into folds every night?—for their habits would seem to indicate that they should be permitted to graze at night and protect themselves from heat during the day. Indeed, sir, we know so little about that stock that you would favor some of your subscribers by publishing in your paper whatever you can find interesting on the subject of sheep husbandry. We want to understand their management throughout the year.

W. J. DUPUY.

February 12th, 1835.

REMARKS ON THE COMPARATIVE ADVANTAGES OF THE THREE-SHIFT AND FOUR-SHIFT ROTATIONS.

To the Editor of the Farmers' Register.

Shirley, January 10th, 1835.

I have been almost ready to yield that the four-field system (with a standing pasture even) would not answer as a general system, after seeing its condemnation by such enlightened and practical agriculturists as Mr. John Wickham and W. B. H.; but upon a little reflection, I have come to the conclusion that there cannot be any thing very bad in a system which those intelligent gentlemen, and most successful farmers, have adopted themselves. For I understand that Mr Wickham has, within a few years past, adopted the four-field system on his low grounds on James River; and the intelligent gentleman under the signature of W. B. H. tells us in your No. 8 Vol. II, that he is now trying it on a farm that has been under the five-field system for ten years, and has become foul from that cause, and that it is his intention to continue it at least for a single round of crops.

Although the fact of such excellent and suc-

cessful farmers as these gentlemen (who condemn the system) having adopted it themselves, speaks volumes for it, I beg leave to make a few remarks on the subject. Mr. Wickham says he has been led to his remarks by the "heavy censure that is cast on the barbarous course of two grain crops, corn, and wheat, in three years, and the approval of three grain crops, wheat, corn, wheat, in four years; as if two grain crops in three years exhausted the land, and three grain crops in four years improved it;" but that is not a fair statement of the question. I only condemned the old three-shift system as formerly practised in Virginia—that is, corn the first year, wheat the second, and pasture the third—the last of which was much the severest part of the system, as the land was literally grazed to death, having no standing pasture to relieve it, and no clover of course—because if clover was sown, it would be destroyed by the excessive grazing. Mr. Wickham also says he has yet to learn that clover would succeed better after three grain crops in succession, than after two; but I imagine he has not yet to learn that it will not succeed at all after two crops of grain, and then grazed to death by cattle, sheep, horses, and hogs, not to say any thing of the rooting of the hogs into the bargain, as practised in the old three-shift system of Virginia. Now if you add a standing pasture to the three-shift system, sow clover, and instead of grazing it closely, turn it under every third year, it may be a very good system, though I do not know anyone who practises it; but in my humble opinion it would not be as profitable a system as the four-shift, though possibly the land might improve under it as fast, or faster. However, of that even I am doubtful—because the three grain crops would enable you to make more manure, and give you more capital to improve with, and thereby enable you to restore the more, for the greater exhaustion of the three grain crops. Mr. Wickham again says, "the four-field system may answer with judicious management, with the aid of animal manures, lime or marl, and standing pastures, but would hardly succeed without these helps." No one pretends to say it will. The standing pasture, and extensive manuring, are parts of the system which cannot be dispensed with, (the lime, or marl would be a great addition of course, though without them the system is still a good one,) and judicious management is all-important in any system. In my communication to the Farmers' Register, on the four-field system, (Vol. I. p. 132,) I did not suggest the idea that it would suit all lands, but that I thought it a good system for good wheat and corn lands—and the idea of recommending it for universal adoption never entered my head.

The very intelligent gentleman under the signature of W. B. H. condemns the four-field system, first, "for its expensiveness." He says, "an unusual large horse-power will be required to fallow up one-fourth of the arable surface of the farm, particularly in dry seasons, &c., and the supernumerary horses that are required for that purpose, and for seeding, are kept during the rest of the year at considerable expense when their labor is not at all necessary." Now in my opinion, and I am borne out in it by the experience of my neighbor, Mr. John Selden of Westover, you can fallow a fourth of a farm every fall with the same team that you would require to plough a third of the

same farm for corn in the spring, and cultivate it through the summer. For instance, on a farm of four hundred acres in the four-field system, and standing pasture, twelve mules and twenty oxen, if the land is strong, and stiff, but if light and clean, ten mules and twelve oxen would be sufficient to fallow one-fourth, or one hundred acres every fall—to sow two hundred acres in wheat, and cultivate one hundred acres in corn every spring. The oxen in the fall are in good order and efficient when the most work is to be done. In the spring the horses, or mules are the only efficient animals on a Virginia plantation, the oxen having gone through the winter are poor,* and unable to work until they have had the summer's run on the pasture.

On a farm of four hundred acres in the three-field system, it would require as many as twelve horses or mules (the number of cattle or oxen would be about the same in both systems,) if the land was strong, and stiff, but ten if light and clean, to break up one-third, or one hundred and thirty-three and a third acres, haul rails, wood, &c. during winter, (having one-third more fencing to do in the three-shift system than the four-field, as in the four-field system you divide the farm into two equal parts, and in the three-field system into three equal parts—) and tend your corn during summer. After your crop of wheat is thrashed out, which is generally by the 5th or 10th of August, in the three-field system, your horses are idle until you can cut up your corn for sowing wheat, which is generally not sooner than the 25th of September or 1st of October; and the very thing that W. B. H. complains of in the four-field system occurs—that is, the feeding idle horses: whereas in the four-field system, your teams are fallowing, and your oxen come much more into play in the four, than in the three-field system, as they are in good order and strong in the fall when most wanted for the four-field system, and in the winter and spring they are poor and weak when most wanted for the three-field system, having then, as I said before, more rails to haul, and more land to break up.

The second objection of W. B. H. to the four-field system is, that the "more valuable crop of corn is sacrificed in part, to the crop of wheat, which is less so." W. B. H. I imagine, is rather singular in his opinion as to the value of the two crops—wheat and corn. As precarious as the wheat crop is in our climate, he will find on an accurate examination of the relative prices of the two crops, that the same land would have produced much more profit in wheat than corn for the

*Though it may appear to be very bad management to let the oxen get poor, and weak in the winter, so as to require a run in the pasture during summer to enable them to fallow in the fall, yet in my opinion, it is sound policy. In winter on a Virginia plantation there is very little for oxen to do, and if you were to attempt to get your oxen fat after the fallowing and seeding season was over, and keep them so all winter, they would "eat their heads off" every winter: so that if you can keep them in tolerable order on your wheat straw, chaff, shucks, and other offal during winter, when they have very little work to do, and give them the run on the pasture during summer, they will get fat and strong for your fallowing in the fall, and not cost you a cent in food, but convert your offal into manure for you.

last fifteen years—wheat ranging from one to two dollars per bushel, and corn from forty to seventy cents per bushel; and I recollect one year when it was down to thirty cents per bushel.

The objection of W. B. H. that the four-field system gives little or no corn for sale, I think, is a mistake, for it will give at least as much corn per acre, which will be as much as the three-field system, *minus* one-fourth for sale; and it will give double as much wheat for sale at least. I say it will give as much corn per acre very confidently, because it will enable you to manure so much more land, having so much more straw wherewith to make manure; so that you will be enabled to manure a much larger portion of your corn-field; and although the corn is after a crop of wheat, it will be equal or better in consequence of the larger manuring, than in the three-field system; and I imagine no one will doubt that one hundred acres of clover fallow, and one hundred acres of corn-field wheat, will yield double as much as one hundred and thirty-three and a third acres of corn-field wheat—however better the corn-field wheat may be in the three, than the four-field system.

The fourth and only sound objection to the four-field system is, "that the three grain crops in succession is opposed to the experience of all good cultivators both in this country and Europe"—and this I admit is a defect in the system; but there are few things in this world without some defects, and we who contend for the system, think it has as few as any other. Besides, we think, that the large quantity of manure made under this system does away in a great measure the bad effects of the three grain crops in succession.

W. B. H. prefers the five-field system, "if a part is to be cut off for pasture." To the five-field system I have no objection, except that it requires too much fencing, requiring five fields to be fenced in, instead of two divisions, as in the four-field system. When I first altered my system from three to four fields, I was very anxious to adopt the five-field system, but for the fencing. But there is no difference in favor of the five-field system as to exhaustion, unless you have a standing pasture, (and then it would be six fields,) you are compelled to graze one of the fields at all seasons, wet or dry. Our four-field system with a standing pasture is somewhat of a five-field system itself.

W. B. H. says, "the four-field system was practised at Dover in Goochland, long before it was tried in Curle's Neck, by a Mr. Harding, who leased the estate, and that it was found to be in a very impoverished condition by the gentleman who succeeded him." But W. B. H. does not tell us whether there was a standing pasture, and whether he used clover and plaster as a part of the system—(which I imagine was hardly done by a tenant—) and we cannot admit it to be the system we recommend, unless combined with a standing pasture, the fourth of the land annually sown in clover, and plastered, and made as perfect as the system is capable of. Then if it fails we will give up. I understand however, that this very gentleman, (Mr. Harding,) after leaving Dover, purchased an estate on James River not in very good condition, and put it under the four-field system, with the use of clover and plaster, and that he improved it very much under that system; and when he died, he left his estate in a very high state of improvement, and what is more, he left the repu-

tation of being one of the best, and most successful agriculturists in all the state of Virginia.

W. B. H. remarks, and very justly too, "that 'Arator's' four-field system is the very best system in the world for thin lands." That has been my opinion for many years; but on land of tolerable fertility in this part of the country, it soon becomes too foul, and the profit is too small for good land. It is the best, and only system for our poor forest land, and should be adopted by every farmer whose land will not bear a more rigid system.

HILL CARTER.

SHEEP MANAGEMENT AND PROFITS IN LOWER VIRGINIA.

To the Editor of the Farmers' Register.

Mantura, Surry Co. Feb. 12, 1835.

I took up the last number of your Register this morning, and in glancing over the vignette on the cover, I was surprised to see that the sheep had been left out, not by design I hope, as I should be sorry to see an animal to which I am so partial, and one to which we are all under so many obligations, treated with so much neglect. I will give you in a very succinct manner, my mode of managing sheep, and if you think it may be of any advantage to the community at large, you are welcome to give it publicity.

I keep about 100 ewes, principally for the benefit of the wool in clothing my negroes, which yield upon an average about three pounds. I raise from 80 to 90 lambs, all of which I sell in Norfolk (except those I keep for my own table) for \$3 a piece, and am told that the butcher gets from \$1 25 to \$1 50 per quarter for them. In order to keep up my stock, I am compelled to purchase ewes, for all descriptions of which I give \$1 50 each, some of them of course being very indifferent. I keep them constantly in pastures, a number of them being belled in order to give the alarm when attacked by thieves or dogs. The bell strap should be lengthened in November, on account of the growth of the wool. In December I commence feeding with one gill of corn meal per day, and occasionally cotton seed, which they are very fond of, and salt once a week. I continue this treatment until they have lambs, when I separate them, putting the ewes and lambs in another pasture, and increase their allowance of meal to a half pint, with as many cotton seed as they will eat, or pea hulls and fodder, when I have not the seed to spare. I pursue this course until the pasture affords a sufficient quantity of grass, which is about the 15th of April, when I leave them to shift for themselves, except giving them salt,

JAMES WILSON.

A REMARKABLE CROP OF CORN.

To the Editor of the Farmers' Register.

Nelson Co. Feb. 17, 1835.

A small piece of land in this vicinity was made to produce the last year a crop of corn so unusual in the amount per acre, as to attract much notice in this region, and perhaps to merit being recorded for more public attention. It was grown on an island in James River, about two miles from the mouth of Rockfish. The whole island, it is sup-

posed, may contain $3\frac{1}{2}$ acres. But the portion cultivated was estimated not to exceed three—a part of the upper end having been left in trees and shrubbery to arrest logs and other trash brought down by freshets, which might otherwise injure the crop, and a part left untilled near the water's edge all around. I rode with the manager over the ground and concurred in the opinion expressed by more competent judges who had previously visited it, that the above estimate was not extravagant. The product measured was eighty-one and a half barrels, or over twenty-seven barrels to the acre.

The mode of cultivation as reported by the overseer, was as follows. The ground after being cleared up was laid off in drills four feet apart. A coulter was then drawn to its full depth, backwards and forwards along the direction of these drills, and a single furrow with a two-horse plough was thrown to them on each side. The top of the bed thus formed, was again opened by a coulter, and the corn sowed in March, as thickly as cotton seed usually are. It was twice cut down by frost, and many of the plants pulled up by birds. When thinned, near the parts thus depredated, three and four stalks were left standing together, and the rest left at intervals of four to six inches. As usual here, the coulter was run next the corn after coming up. The balks were broken up with a one-horse plough. It received no cultivation after harvest, and the result was as mentioned. The overseer thinks that much was pillaged by boatmen, and a considerable quantity lost by the weeds, which in many places were as high as the corn—and is confident that with increased care a larger crop may be made from the same land another year.

It is the purpose of the proprietor, Mr. Samuel Jones of Buckingham, to have an accurate survey of the island, so that we may see the exact result. The land is not apparently richer than much in the same neighborhood, and along the river—so that we may legitimately infer that there are many farmers unaware of the capability of their soil.

N. F. CABELL.

REAL NAMES TO COMMUNICATIONS—KEEPING POTATOES.

To the Editor of the Farmers' Register.

King and Queen, 21st Feb., 1835.

I agree most cordially with your Matthews correspondent, Peter De Quir, in his excellent and pointed suggestions as to *fictitious signatures*, except his own most *striking inconsistency*. Now I may have fallen into a mistake as to this matter, but my impression is, that no such name as Peter De Quir is really known in Matthews; if so, is it not unfortunate that we should not have been favored with *all* the reasons for secrecy, while this sensible writer had the subject in hand? For certainly if he had fairly uncovered himself, we should at least have seen him *undisguised*! But, Mr. Editor, I designed to say, that I am perfectly convinced that your Matthews correspondent is right in theory; and that every man should divest himself of all false pretensions, and avoid disguise, in giving either his *opinions* or *practice* upon the great subject of agriculture. Let every man be fairly and fully recognized; whether he shall be

found scientific enough to give geological, chemical, or philosophical essays, or only so plain as to be able to say something, as I shall presently, upon so small a topic as *small potatoes*. Your work is designed to do good—it has done, already, great good: but I humbly think, that it may be rendered greatly more beneficial, by the apparently small amendment contemplated by the theory of your friend Peter, which I shall certainly carry out into practice, hoping soon to hear from him again. Suppose, Mr. Editor, you were, as your subscribers are, compelled to receive and peruse some twenty or fifty long letters every month, touching all the various concerns of the contents of one of the numbers of the Register, all under fictitious names, or from anonymous pens. If you could do no better, you might say of it well; but when it is known to be so easy a matter for a different state of things to be accomplished, how are we made to desire to know the name of every man who thus writes to us! And this is no forced supposition. Your contributors are not really writing to you, as I appear to be doing now; but are actually writing to me, and to all your subscribers. I'll venture to say it, that if you will take the vote of your whole list, that nine-tenths will be with me. But I shall forget the *potatoes*. They shall be forthcoming, however; and what I wish besides, *the best method* that I have tried for preserving them through the winter. I mean Irish potatoes.

After the tops have withered under the influence of the frost, in mild weather let them be dug. Some appear to be more anxious to avoid the appearance and effects of frost, than seems to be important. But for the potato becoming saturated with water, it would remain good, in all probability, through the winter, in the patch. All that I do then, is simply to dig, and carry the crop into a dry cellar, deposit them in a heap as carefully as is convenient, and cover them over about six or eight inches thick with wheat straw; upon which it is well to lay an additional light cover of boards. They thus seem to derive some little moisture from the earth beneath, so as to keep them plump, while the simple covering described, excludes the air and influence of cold.

So much then, Mr. Editor, for fictitious names, and the best method of preserving Irish potatoes. I have no idea of venturing much farther upon the great products of agriculture, because I mean to subscribe my name, and might thereby be brought into disproportionate discredit. Believing that the suggestions of the above plan will be pardoned, if found to be nothing more than an old thing, upon the ground of a desire to do good even in a small way, having often heard difficulties set forth upon the subject, I cheerfully submit it.

J. DU VAL,

[We agree entirely with our correspondent as to the propriety and necessity of the real names of correspondents being affixed to all communications on practical agriculture. This opinion we have repeatedly and strongly expressed—and have only refrained from continuing to urge it, because it seemed useless. We cannot compel correspondents to adopt this course; but of this they may be assured—that by presenting their pieces without responsible signatures, they des-

troy half their value, and prevent their receiving the attention from the public, which they would otherwise command. But the evil is actually worse than our correspondent supposes. Some correspondents, not content with withholding their names from the readers of the Farmers' Register, conceal them from the editor. Nay, this disguise has been affected, where it could have no possible effect in concealing the writer where he was known, and only served to lessen the credit and proper value of the communication, where he was not known. Communications which had been publicly read before an agricultural society, and approved, have been sent for publication without any clue to the authors' names. We take this occasion, however, to say, that communications of this kind, already made public, will not again be published as anonymous. As to other correspondents, if they choose to take away both credit and interest from their communications, by withholding their names—be it so. But it is at least necessary that their names should be made known to the editor: and unless that is done in future, very little respect will be paid to such pieces, or to writers who require to be so closely concealed. And further—if any name sent is not on our subscription list, or otherwise known, it will be supposed to belong to such a "man of straw" as it seems Peter De Quir is suspected to be. Communications signed by real names, will always receive (as they deserve) much more respect and attention from the editor, as well as from all readers, than the same pieces would, without that stamp of responsibility and value.

Since writing the opinions expressed above, a striking illustration of their truth has been received in a private letter from a friend, who is himself one of our most valuable *anonymous* correspondents. He asks, "Who is your correspondent from — in No. —?" Are his crops made on *land*, or on *paper*? I should guess the latter." Now if the piece referred to had been signed by the writer's proper name, (which in this case we have, though, as in all such cases, *confidentially*,) probably no such doubt would have existed. Having so stated this inquiry as to give no clue to the true object, we should be very glad if every anonymous correspondent would make the application to his own communication—and particularly that the friend who has made the inquiry, will profit by the lesson which his words indirectly but forcibly convey to others.]

Extract from the Southern Agriculturist.

EXPERIMENT, IN KEEPING SWEET POTATOES.

Charleston S. C., Dec. 23rd, 1834.

It became necessary for me to spend the whole winter together with my family in the city. Having made a fine crop of potatoes, I wished that we should enjoy at least a portion of them, and at the same time, did not feel disposed to purchase what was in such abundance on the plantation. As opportunities would offer but seldom to bring them from thence, I determined to pack some up in barrels, and knowing from sad experience, how rapidly they decayed when thus packed alone, I had a parcel of sand got, and placing a small

quantity at the bottom, proceeded to place the potatoes in, packing them as close as possible, and then filling the interstices with sand, as we advanced. The only care taken was that none should be bruised, and that all specked and rotten potatoes should be excluded. When the barrel was filled, we placed about an inch of sand at the top, having first shaken them so as to have every part completely filled with the sand. In this state they were headed up and sent to the city. I do not believe that I had a potato less in the barrels, than if I had not used the sand, for they were placed in first and the sand afterwards thrown in and shaken down. I took no care to have dry sand, but used that which happened to be handy at the place where they were packed, and the most of it was moist. These potatoes lasted us until very late in the spring without sprouting or shriveling, as is always the case when kept late, nor did I loose many by rotting, perhaps not more than half a dozen to the barrel, and this I had every reason to expect, for the potatoes had been harvested several weeks, and in selecting them, the heaps were overhauled. Those which rotted, in all probability, had received some injury or had the seeds of decay, though not obvious at the time.

From the Genesee Farmer.

HARVESTING OF CORN.

Mr. Editor—Some of my opinions respecting the best and most profitable mode of harvesting a crop of corn, were considerably shaken by the communications which appeared in the last volume of the Farmer on this subject, from men whose testimony is of the greatest weight. My impression has been, that to secure the greatest quantity of good sound corn, it was best, as soon as the tops had become somewhat dry, and the ears hard glazed, to top the corn, and let the ears stand on the stalks till the time of gathering, and such of course has generally been my practice. I did this, because I believed that after the top had performed its office of fecundating the plant, it became in a manner useless; and that stalks dry, and leaves withered, however excellent as a fodder for cattle, could do little or nothing towards elaborating the juices necessary for the perfection of the ears. It besides appeared to me that the fresh and green husks which farmers know retain their power of elaborating sap much longer in general than the leaves, were designed by nature to supply the ears with food; and though opposed to the mutilation of plants generally, as the means of increasing their productiveness, topping corn I did not consider as an operation of that kind. When such men, however, as Buel and Coleman, maintain a different theory, and backed by experiment, contend that topping corn is hurtful, it certainly becomes minor agriculturists to pause, and test the question thoroughly. These farmers, and others assert, that topping corn is decidedly injurious—that it materially lessens the actual weight of the crop—and, therefore, that allowing the stalk to remain whole till the time of gathering, or else cutting it up close to the bottom, is the preferable mode of harvesting.

These experiments, though so far as they were detailed, they appeared to be very fairly conducted, were not altogether satisfactory to me, as they did

not go far enough. Every farmer is sensible, that corn topped becomes more thoroughly dried by exposure to the direct rays of the sun, and must therefore be expected to weigh less at the time of gathering than corn shaded by the tops, or cut up by the bottom and standing in stacks till husked. My corn the past year had been cut up by the bottom, with the exception of a few pieces of rows, before the thought of making any experiments myself on the subject occurred. In order to see, however, whether my ideas of the different rate of shrinkage between topped corn, and that cut up, were correct, I carefully weighed a basket full of ears of each kind, at the time of gathering, and placing them in a dry chamber, where they lay undisturbed, let them remain until the middle of January, when I had both kinds carefully shelled and weighed. By this experiment, it appeared that the corn cut up by the bottom shrunk three pounds in a bushel more than the topped; but this did not mark the extent of the difference, as at the time of shelling, the former was easily distinguished from the latter by its comparative dampness, though both parcels were bright, fine corn. I cannot, therefore, consider the question as entirely put at rest by any experiments that have yet been made, but as the matter is certainly one of importance, I hope that another season will not pass without its being done effectually. In order to do this, all the specimens must not only be weighed and measured at the time of gathering and at the time of shelling, but be suffered to remain in some position favorable to the evaporation of all dampness until the corn is completely and thoroughly dried, when a careful comparison of the whole would show the true result.

W. G.

From the Genesee Farmer.

ON SPLITTING FIRE-WOOD.

We have lately examined a quantity of fire-wood, which was cut and corded last winter; and we have become still more strongly impressed with the importance of having *every stick split* that is large enough to receive a stroke of the axe, longitudinally. It not only dries better, but some kinds of wood are rendered by this operation nearly of double value; and we are warranted by our examinations in saying that *hickory* is one of those kinds. Sticks of six or eight inches diameter, which were quartered at that time, are now seasoned, hard and solid; while such as were left to *soak in their sap*, are most miserably worm eaten. The round sticks of bass-wood escaped these depredators, but their value is greatly lessened by incipient decay; and retain too much moisture to be profitably used without kiln-drying. We are persuaded that to split all such wood, and to *let out the sap*, is a most judicious investment of capital.

From the Monthly Magazine.

THE BURYING BEETLE.

A foreign naturalist gives a very interesting account of the industry of this insect. He had often remarked that dead moles, when laid upon the ground, especially if on loose earth, were almost sure to disappear in the course of two or three days, often of twelve hours. To ascertain the cause, he placed a mole upon one of the beds in his garden.

It had vanished by the third morning; and on digging where it had been laid, he found it buried to the depth of three inches, and under it four beetles, which seemed to have been the agents in this singular inhumation. Not perceiving any thing particular in the mole, he buried it again; and on examining it at the end of six days, he found it swarming with maggots, apparently the issue of the beetles, which M. Gleditsch now naturally concluded had buried the carcass for the food of their future young. To determine these points more clearly, he put four of these insects into a glass vessel, half filled with earth and properly secured, and, upon the surface of the earth, two frogs. In less than twelve hours, one of the frogs was interred by two of the beetles; the other two ran about the whole day as if busied in measuring the dimensions of the remaining corpse, which on the third day was also found buried. He then introduced a dead linnet. A pair of the beetles were soon engaged upon the bird. They began their operations by pushing out the earth from under the body, so as to form a cavity for its reception; and it was curious to see the efforts which the beetles made, by dragging at the feathers of the bird from below, to pull it into its grave. The male, having driven the female away, continued the work alone for five hours. He lifted up the bird, changed its place, turned it and arranged it in the grave, and from time to time came out of the hole, mounted upon it, and trode it under foot, and then retired below, and pulled it down. At length, apparently wearied with this uninterrupted labor, it came forth, and leaned its head upon the earth beside the bird, without the smallest motion, as if to rest itself, for a full hour, when it again crept under the earth. The next day, in the morning, the bird was an inch and a half under ground, and the trench remained open the whole day, the corpse seeming as if laid out upon a bier, surrounded with a rampart of mould. In the evening, it had sunk half an inch lower, and in another day the work was completed, and the bird covered. M. Gleditsch continued to add other small dead animals, which were all sooner or later buried; and the result of his experiment was, that in fifty days four beetles had interred, in the very small space of earth allotted to them, twelve carcasses; viz. four frogs, three small birds, two fishes, one mole, and two grasshoppers, besides the entrails of a fish, and two morsels of the lungs of an ox. In another experiment, a single beetle buried a mole forty times its own bulk and weight in two days.

From the Library of Useful Knowledge, Farmer's Series.

GENERAL HISTORY OF THE HORSE.

[Concluded from p. 597, Vol. II.]

The English Horse.

The earliest record of the horse in Great Britain is contained in the history given by Julius Cæsar of his invasion of our island. The British army was accompanied by numerous war-chariots, drawn by horses. Short scythes were fastened to the ends of the axletrees, sweeping down every thing before them, and carrying terror and devastation into the ranks of their enemies. The conqueror gives a most animated description of the dexterity with which the horses were managed.

What kind of horse the Britons then possessed,

it would be useless to inquire; but, from the cumbrous structure of the car, and the fury with which it was driven, and from the badness or nonexistence of the roads, they must have been both active and powerful in an extraordinary degree. Cæsar deemed them so valuable, that he carried many of them to Rome; and the British horses were, for a considerable period afterwards, in great request in various parts of the Roman empire.

Horses must at that time have been exceedingly numerous in Britain, for we are told that when the British king, Cassibellanus, dismissed the main body of his army, he retained four thousand of his war-chariots for the purpose of harassing the Romans, when they attempted to forage.

The British horse now received its first cross; but whether the breed was thereby improved cannot be ascertained. The Romans having established themselves in Britain, found it necessary to send over a numerous body of cavalry to maintain a chain of posts and check the frequent insurrections of the natives. The Roman horses would breed with those of the country, and, to a greater or less extent, change their character; and from this time, the English horse would consist of a compound of the native and those from Gaul, Italy, Spain, and every province from which the Roman cavalry was supplied. Many centuries afterwards passed by, and we have no record of the character or value, improvement or deterioration, of the animal.

It would appear probable, however, that Athelstan, the natural son of Alfred the Great, and the second in succession to him, paid some attention to the improvement of the horse; for having subdued all the rebellious portions of the Heptarchy, he was congratulated on his success by some of the continental princes, and received from Hugh Capet of France, who solicited his sister in marriage, various presents, doubtless of a nature that would be thought most acceptable to him; and among them several German *running horses*. Hence our breed received another cross, and probably an improvement.

Athelstan seems to have seriously devoted himself to this important object, for he soon afterwards decreed (A. D. 930) that no horses should be sent abroad for sale, or on any account, except as royal presents. This proves his anxiety to preserve the breed, and likewise renders it probable that the breed was beginning to be esteemed by our neighbors. In a document bearing date A. D. 1000 we have an interesting account of the relative value of the horse. If a horse was destroyed, or negligently lost, the compensation to be demanded was thirty shillings; a mare or colt, twenty shillings; a mule or young ass, twelve shillings; an ox, thirty pence; a cow, twenty-four pence; a pig, eight pence; and, it strangely follows, a man, one pound.*

In the laws of Howell the Good, Prince of Wales, and passed a little before this time, there are some curious particulars respecting the value and sale of horses. The value of a foal not fourteen days old is fixed at four pence, at one year and a day it is estimated at forty-eight pence; and

at three years sixty pence. It was then to be tamed with the bridle, and brought up either as a *palfrey* or a *serving horse*; when its value became one hundred and twenty pence; and that of a *wild* or unbroken mare, sixty pence.

Even in those early days, the frauds of dealers were too notorious, and the following singular regulations were established. The buyer was allowed time to ascertain whether the horse were free from three diseases. He had three nights to prove him for the staggers; three months to prove the soundness of his lungs; and one year to ascertain whether he was infected with glanders. For every blemish discovered after the purchase, one-third of the money was returned, except it should be a blemish of the ears or tail.

The practice of letting horses for hire was then known, and then, as now, the services of the poor hack were too brutally exacted. The benevolent Howell disdains not to legislate for the protection of this abused and valuable servant. "Whoever shall borrow a horse, and rub the hair so as to gall the back, shall pay fourpence; if the skin is forced into the flesh, eight pence; if the flesh be forced to the bone, sixteen pence."

One circumstance deserves to be remarked, that in none of the earliest historical records of the Anglo-Saxons or the Welsh, is there any allusion to the use of the horse for the plough. Until a comparatively recent period, oxen alone were used in England, as in other countries, for this purpose; but about this time (the latter part of the tenth century) some innovation on this point was creeping in, and, therefore, a Welsh law forbids the farmer to plough with horses, mares, or cows, but with oxen alone. On one of the pieces of tapestry woven at Bayonne in the time of William the Conqueror, (A. D. 1066) there is the figure of a man driving a horse attached to a harrow. This is the earliest notice we have of the use of the horse in field labor.

With William the Conqueror came a marked improvement in the British horse. To his superiority in cavalry this prince was chiefly indebted for the victory of Hastings. The favorite charger of William was a Spaniard. His followers, both the barons and the common soldiers, came principally from a country in which agriculture had made more rapid progress than in England. A very considerable portion of the kingdom was divided among these men; and it cannot be doubted that, however unjust was the usurpation of the Norman, England benefited in its husbandry, and particularly in its horses, by the change of masters. Some of the barons, and particularly Roger de Boulogne, earl of Shrewsbury, introduced the Spanish horse, on their newly-acquired estates. The historians of these times, however, principally monks, knowing nothing about horses, give us very little information on the subject.

In the reign of Henry I. (A. D. 1121) the first Arabian horse, or, at least, the first on record, was introduced. Alexander I., king of Scotland, presented to the church of St. Andrew's an Arabian horse, with costly furniture, Turkish armor, many valuable trinkets, and a considerable estate.

Forty years afterwards, in the reign of Henry II., Smithfield was celebrated as a horse-market. Fitz-Stephen, who lived at that time, gives the following animated account of the manner in which the *hackneys* and *charging-steeds* were tried there,

* According to the Anglo-Saxon computation, forty-eight shillings made a pound, equal in silver to about three pounds of our present money, in value to fifteen or sixteen pounds, and five pence made one shilling.

by racing against one another. "When a race is to be run by this sort of horses, and perhaps by others, which also in their kind are strong and fleet, a shout is immediately raised, and the common horses are ordered to withdraw out of the way. Three jockeys, or sometimes only two, as the match is made, prepare themselves for the contest. The horses on their part are not without emulation; they tremble and are impatient, and are continually in motion. At last, the signal once given, they start, devour the course and hurry along with unremitting swiftness. The jockeys inspired with the thought of applause, and the hope of victory, clap spurs to their willing horses, brandish their whips, and cheer them with their cries." This description reminds us of the more lengthened races of the present day, and proves the blood of the English horse, even before the Eastern breed was tried.

Close on this followed the Crusades. The champions of the Cross certainly had it in their power to enrich their native country with some of the choicest specimens of Eastern horses, but they were completely under the influence of superstition and fanaticism, and common sense and usefulness were forgotten.

An old metrical romance, however, records the excellence of two horses belonging to Richard Cœur de Lion, which he purchased at Cyprus, and were therefore, probably, of Eastern origin.

Yn this worlde they hadde no pere,*
Dromedary nor destrere,†
Stede, Rabyte,‡ ne Cammele,
Goeth none so swifte, without fayle:
For a thousand pownd of golde,
Ne should the one be solde.

The war-steed was defended by mail or plate, much on the plan of the harness of the knight himself. His head was ornamented with a crest. The head, chest, and flanks, were wholly or partially protected; and sometimes, he was clad in complete steel, with the arms of his master engraved or embossed on his *bardings*. The bridle of the horse was always as splendid as the circumstances of the knight allowed, and thus a horse was often called *Brigliadore*, from *briglia d'oro*, a bridle of gold. Bells were a very favorite addition to the equipment of the horse. The old Troupadour, Arnold of Marson, says, that "nothing is so proper to inspire confidence in a knight, and terror in an enemy."

The price of horses at this period was singularly uncertain. In 1185, fifteen breeding mares sold for two pounds twelve shilling and sixpence. They were purchased by the monarch, and distributed among his tenants, and in order to get something by the bargain, he charged them the great sum of four shillings each. Twenty years afterwards, ten capital horses brought no less than twenty pounds each; and, twelve years later, a pair of horses were imported from Lombardy, for which the extravagant price of thirty-eight pounds thirteen shillings and fourpence was given. The usual price of good handsome horses was ten pounds, and the hire of a car or cart, with two horses, was tenpence a-day.

To King John, hateful as he was in all other respects, we are yet much indebted for the atten-

tion which he paid to agriculture generally, and particularly to improving the breed of horses. He imported one hundred chosen stallions of the Flanders kind, and thus mainly contributed to prepare our noble species of draught-horses, as unrivalled as the horses of the turf.

John accumulated a very numerous and valuable stud. He was eager to possess himself of every horse of more than usual power; and, at all times, gladly received, from the tenants of the crown, horses of a superior quality, instead of money, for the renewal of grants, or the payment of forfeitures belonging to the crown. It was his pride to render his cavalry, and the horses for the tournament and for pleasure, as perfect as possible. It could not be expected that so haughty a tyrant would concern himself much with the inferior kinds; yet while the superior was becoming rapidly more valuable, the others would, in an indirect manner, partake of the improvement.

One hundred years afterwards, Edward II. purchased thirty Lombardy *war-horses*, and twelve heavy draught-horses. Lombardy, Italy, and Spain were the countries whence the greater part of Europe was then supplied with the most valuable cavalry or parade horses. Horses for agricultural purposes were chiefly procured from Flanders.

Edward III. devoted one thousand marks to the purchase of fifty Spanish horses; and of such importance did he conceive this addition to the English, or rather mingled blood, then existing, that formal application was made to the kings of France and Spain to grant safe conduct to the troop. When they had safely arrived at the royal stud, it was computed that they had cost the monarch no less than thirteen pounds six shillings and eightpence per horse, equal in value to one hundred and sixty pounds of our present money.

This monarch had many *running-horses*. The precise meaning of the term is not, however, clear. It might be light and speedy horses in opposition to the war horse, or those that were literally used for the purpose of racing. The average price of these running-horses was twenty marks, or three pounds six shillings and eightpence. Edward was devoted to the sports of the turf or the field, or he began to see the propriety of crossing our stately and heavy breed with those of a lighter structure and greater speed.

There was, however, one impediment to this, which was not for a very long period removed. The soldier was cased in heavy armor. The knight, with all his accoutrement, often rode more than twenty-five stone. No little bulk and strength were required in the animal destined to carry this back breaking weight. When the musket was substituted for the cross-bow and battle-axe, and this iron defence, cumbrous to the wearer and destructive to the horse, was useless, and laid aside, the improvement of the British horse in reality commenced.

While Edward was thus eager to avail himself of foreign blood, with the two frequent selfishness of the sportsman, he would let no neighbor share in the advantage. The exportation of horses was forbidden under very heavy penalties. One case in which he relaxed from his severity is mentioned, when he permitted a German merchant to re-export some Flanders horses which he had brought on speculation; but he was strictly forbidden to

*Peer, equal.

†War horse.

‡Arabian.

send them to Scotland. Nay, so jealous were these sister-kingdoms of each other's prosperity, that so late as the time of Elizabeth, it was felony to export horses from England to Scotland.

The English horse was advancing, although slowly, to an equality with, or even superiority over those of neighboring countries. His value began to be more generally and highly estimated, and his price rapidly increased—so much so, that breeders and the dealers, then, as now, skillful in imposing on the inexperienced, obtained from many of our young grandees enormous prices for them. This evil magnified to such an extent, that Richard II. (1386) interdicted to regulate and determine the price. The proclamation which he issued is interesting not only as proving the increased value of the horse, but showing what were, four hundred and fifty years ago, and what are, still, the chief breeding districts. It was ordered to be published in the counties of Lincoln and Cambridge, and the East and North Ridings of Yorkshire; and the price of the horse was restricted to that which had been determined by former sovereigns. A more enlightened policy has at length banished all such absurd interferences with agriculture and commerce.

We can now collect but little of the history of the horse until the reign of Henry VII., at the close of the fifteenth century. He continued to prohibit the exportation of stallions, but allowed that of mares when more than two years old, and under the value of six shillings and eightpence. This regulation was, however, easily evaded, for if a mare could be found worth more than six shillings and eightpence, she might be freely exported on the payment of that sum.

Henry VIII., a tyrannical and cruel prince, but fond of show and splendor, was very anxious to produce a valuable breed of horses; and the means which he adopted were both perfectly in unison with his arbitrary disposition, and very little calculated to effect his object. He affixed a certain standard, below which no horse should be kept. The lowest height for the stallion was fifteen hands, and for the mare thirteen hands; and even before they had arrived at their full growth, no stallion above two years old, and under fourteen hands and a half, was permitted to run on any forest, moor, or common, where there were mares. At "Michaelmas" the neighboring magistrates were ordered to "drive" all forests and commons, and not only destroy such stallions, but all "unlikely tits," whether mares or geldings, or foals, which they might deem not calculated to produce a valuable breed. He likewise ordained, that in every deer-park a certain number of mares, in proportion to its size, and each at least thirteen hands high should be kept; and that all his prelates and nobles, and "all those whose wives wore velvet bonnets," should keep stallions for the saddle at least fifteen hands high. These ordinances perished with the tyrant by whom they were promulgated.

The reign of Henry VIII. produced the earliest English treatise on agriculture, and the management of horses and cattle. It was written by Sir A. Fitzherbert, Judge of the Common Pleas, and contains much useful information. It is entitled, "Boke of Husbandry;" and, being now exceedingly rare, an extract from it may not be unacceptable. It would seem that the mare had been but

lately employed in husbandry, for he says, "A husbunde may not be without horses and mares, and specially if he goe with a horse-ploughe he must have both, his horses to draive; his mares to brynge colts to upholde his stocke, and yet at many times they may draive well if they be well handled." The learned judge shared the common fate of those who have to do with the horse. "Thou grasyer, that mayst fortune to be of myne opinion or condition to love horses, and young coltes and foles to go among thy cattle, take hede that thou be not beguiled as I have been a hundred tymes and more. And first thou shalt knowe that a good horse has 54 properties, that is to say, 2 of a man, 2 of a badger, 4 of a lion, 9 of an ox, 9 of a hare, 9 of a foxe, 9 of an asse, and 10 of a woman."*

The tyrannical edicts of Henry VIII. had the effect which common sense would have anticipated—the breed of horses was not materially improved, and their numbers were sadly diminished. When the bigot, Philip of Spain, threatened England, in the reign of Elizabeth, with his Invincible Armada, that princeess could muster in her whole kingdom only three thousand cavalry to oppose him; and Blundeville, who wrote at this time a very pleasant and excellent book on the art of riding, speaks contemptuously of the qualities of these horses. The secret of improving the breed had not been then discovered; it had been attempted by arbitrary power; and it had extended only to those crosses from which little good could have been expected: or, rather, it had more reference to the actual situation of the country, and the heavy carriages, and the bad roads, and the tedious travelling which then prevailed, than to the wonderful change in these which a few centuries were destined to effect.

Blundeville describes the majority of our horses as consisting of strong, sturdy beasts, fit only for slow draught, and the few of a lighter structure being weak and without bottom. There were, however, some exceptions, for he relates a case of one of these lighter horses travelling eighty miles in a day—a task which in later times has been too often and cruelly exacted from our half-bred nags.

An account has been given of the racing trial of the horses in Smithfield market. Regular races were now established in various parts of England. Meetings of this kind were first held at Chester and Stamford; but there was no acknowledged system as now; and no breed of racing horses. Hunters and hackneys mingled together, and no description of horse was excluded.

There was at first no course marked out for the race, but the contest generally consisted in the

*Later writers have pirated from Sir A.; but have not improved upon him. The following description of the horse is well known. "A good horse should have three qualities of a woman,—a broad breast, round hips, and a long mane;—three of a lion,—countenance, courage, and fire;—three of a bullock,—the eye, the nostril, and joints;—three of a sheep,—the nose, gentleness, and patience;—three of a mule,—strength, constancy, and foot;—three of a deer,—head, legs, and short hair;—three of a wolf,—throat, neck, and hearing;—three of a fox,—ear, tail and trot;—three of a serpent,—memory, sight, and turning;—and three of a hare or cat,—running, walking, and suppleness."

running of *train-cent* across the country, and sometimes the most difficult and dangerous part of the country was selected for the exhibition. Occasionally our present steeple chase was adopted with all its dangers, and more than its present barbarity; for persons were appointed cruelly to flog along the jaded and exhausted horses.

It should, however, be acknowledged that the races of that period were not disgraced by the system of gambling and fraud which seems to have become almost inseparable from the amusements of the turf. The prize was usually a wooden bell adorned with flowers. This was afterwards exchanged for a silver bell, and "given to him who should run the best and farthest on horseback on Shrove Tuesday." Hence the common phrase of "bearing away the bell."

Horse-racing became gradually more cultivated; but it was not until the last year of the reign of James I., that rules were promulgated and generally subscribed to for their regulation. That prince was fond of field sports. He had encouraged, if he did not establish, horse-racing in Scotland, and he brought with him to England his predilection for it; but his races were more often matches against time, or trials of speed and bottom, for absurdly and cruelly long distances. His favorite courses were at Croydon and on Enfield Chase.

Although the Turkish and Barbary horses had been freely used to produce with the English mare the breed which was best suited to this exercise, little improvement had been effected. James, with great judgement, determined to try the Arab breed. Probably, he had not forgotten the story of the Arabian, which had been presented to one of the Scottish churches, five centuries before. He purchased, from a merchant named Markham, a celebrated Arabian horse, for which he gave the extravagant sum of five hundred pounds. Kings, however, like their subjects, are often thwarted and governed by their servants, and the Duke of Newcastle took a dislike to this foreign animal. He wrote a book, and a very good one, on horsemanship, and described this Arabian as a little bony horse, of ordinary shape, setting him down as good for nothing, because, after being regularly trained, he could not race. The opinion of the Duke, probably altogether erroneous, had, for nearly a century, great weight; and the Arabian horse lost its reputation among the English turf-breeders.

A South-Eastern horse was afterwards brought into England, and purchased by James, of Mr. Place, who was afterwards stud-master, or groom to Oliver Cromwell. This beautiful animal was called the White Turk, and his name and that of his keeper will long be remembered. Shortly afterwards appeared the Helmsley Turk, introduced by Villiers, the first duke of Buckingham. He was followed by Fairfax's Morocco Barb. These horses speedily effected a considerable change in the character of our breed, so that Lord Harleigh, one of the old school, complained that the great horse was fast disappearing, and that horses were now bred light and fine for the sake of speed only.

Charles I. ardently pursued this favorite object of English gentlemen, and a little before his rupture with the parliament, established races in Hyde Park, and at Newmarket. The civil wars somewhat suspended the improvement of the breed; yet the advantage which was derived by

both parties from a light and active cavalry, sufficiently proved the importance of the change which had been effected; and Cromwell perceiving, with his wonted sagacity, how much these pursuits were connected with the prosperity of the country, had his stud of race-horses.

At the Restoration a new impulse was given to the cultivation of the horse by the inclination of the court to patronize gaiety and dissipation. The races at Newmarket were restored, and as an additional spur to emulation, royal plates were now given at each of the principal courses. Charles II. sent his master of the horse to the Levant, to purchase brood mares and stallions. These were principally Barks and Turks.

From that period to the middle of the last century, the system of improvement was zealously pursued: every variety of Eastern blood was occasionally engrafted on ours, and the superiority of the engrafted, above the very best of the original stock, began to be evident.

Man is rarely satisfied with any degree of perfection in the object on which he has set his heart. The sportsman had now beauty of form, and speed and stoutness, scarcely an approach to which had been observed in the original breed. Still some imagined that this speed and stoutness might possibly be increased; and Mr. Darley, in the latter part of the reign of Queen Anne, had recourse to the discarded and despised Arabian. He had much prejudice to contend with, and it was some time before the Darley Arabian attracted notice. At length the value of his produce began to be recognised, and to him we are greatly indebted for a breed of horses of unequalled beauty, speed and strength.

This last improvement now furnishes all that can be desired: nor is this true only of the thorough-bred or turf-horse; it is, to a very material degree, the case with every description of horse. By a judicious admixture and proportion of blood, we have rendered our hunters, our hackneys, our coach, nay even our cart horses, much stronger, more active, and more enduring, than they were before the introduction of the race-horse.

For the Farmers' Register.

THE EFFECT OF SEVERE FROST ON LAND— HARROWING IN CLOVER SEED.

Fairfax County, February 15th, 1835.

Cold winter is now I trust upon its final retreat to the north; and though we farmers have suffered much in the flesh, mother earth will soon show that it brought "healing in its wings." I could have wished that it had been longer and more unyielding—for I have long remarked, that the earth was fattened and invigorated by long cold winters, and especially when they came with much snow. Heavy floods followed by a hot sun, in all the flat country except that which is sandy, brings on a kind of deadly hide-bound condition, which can only be cured by hard frost. Now is the time for seeding clover, unless the farmer is so attentive to his interest, as to harrow in the seed—in that case, he must wait until the frost leaves the ground. Let him not fear injury to the crop—for independent of the full and perfect insertion of the clover, the wheat will receive a benefit quite equal to the expense of harrowing. Upon light san-

dy land, clover will not take, unless harrowed in. I would recommend the application of one bushel of plaster immediately after the harrow.

JEREMIAH.

THE MODE OF YOKING OXEN IN CUBA.

To the Editor of the Farmers' Register.

Your magazine having this moment met my eye, and approving greatly its object, I beg leave through that channel to make a communication, which I trust will be deemed interesting to the agriculturists of your quarter.

I am myself a planter in the island of Cuba, and an enthusiast as regards improvements which have a tendency to advance the interest of agriculture in general. It is therefore with feelings approaching to horror, that in travelling through all the southern states, (and no doubt the same practice prevails in the northern,) I have observed the oxen, employed in the fields, to be yoked together at the shoulder, and the whole labor of the animal, consequently, to press upon that part, as if it were the most convenient point, and that of the greatest strength; than which nothing can be more foreign to the fact.

The strength of the ox lies in its neck, and the muscles and tendons thereto appertaining—as is well known to every one acquainted with this noble animal—and consequently, the proper place for the yoke is behind the horns, and attached thereto. In this position, the whole strength of the animal is put forth without the least inconvenience, or effort.

This is by no means a new theory; but an old established practice among various nations. The Spaniards have universally adopted it, and I myself have no other method. I have communicated it very generally, wherever I have found the abominable practice prevail of yoking to the fore-shoulder. I should have thought that a bare insinuation of this improvement, (suggested years ago) would have had the effect of an instant adoption in this country—but as I have said, I am still a witness, recently, of the same vile practice wherever I have travelled.

AGRICULTOR.

Washington City.

INQUIRY INTO THE ORIGIN OF HORIZONTAL PLOUGHING.

To the Editor of the Farmers' Register.

Although a constant reader of your journal, in looking over some of the recent numbers a day or two since, I came across an article which by some chance had escaped my notice until then, and which, although it gives an interesting account of a particular district of our state, contains a paragraph which I think should not pass altogether unnoticed. I allude to the communication of "A Furrow Turner," in the Register for October last. Although highly pleased with his graphic description of the properties of the South West Mountain soil, I believe him mistaken with respect to the history of "horizontal ploughing"—certainly so, if we are to infer from his criticism of the passage from *Arator*, that it was not known elsewhere, previously to its introduction in Albemarle. Having heretofore been struck with this passage myself, I was induced to make further inquiry, to

learn if no mention was made of this important improvement, or its principle, in the earlier books of husbandry. The search resulted in the conviction, that it was known long ago—that in this, as in so many other things, the ancients have stolen our best thoughts, and left to the moderns, but the credit of adoption and dissemination.

I do not know on what authority *Arator* asserted its existence in Scotland a century since—whether that of Lord Kames or some one else. But a passage or two which I subjoin from Sir John Sinclair will go to show, that this, or something very nearly resembling it, was known there before the present century.

"In regard to steep banks or declivities, there are four modes in which *ridges* may be laid out.

First. When they are planted on the same level. This is done partly with a view of preventing the soil and manure from being washed down, and partly from the idea that it is easier for the cattle to work it. But it keeps up the water in the furrows, and is an awkward mode of ploughing. Sometimes this sort of ridge is carried all around a small hill in a spiral form, beginning at the bottom."

Second. When the ridges are straight up and down. *Third.* When they receive a diagonal direction sloping to the left. *Fourth.* When they slope to the right.

Now, although he condemns the second and third mode, and prefers the fourth, yet his recommendation is succeeded by the following exception:

"Where the land is exceedingly steep, it is often necessary to plough directly *across*, throwing the furrow-slices all down hill, and with the ordinary plough going back empty. But where there is much land of this excessive steepness to cultivate, a plough with a shifting mould-board, usually called a *turnwrest* plough, admits of ploughing both backwards and forwards, shifting the mould-board in such a manner as always to throw the furrow-slice down the hill."—*Systems of Husbandry*, Vol. I. pp. 168, 170.

In the first volume of *The General Report of Scotland*, drawn up under the direction of the same author, we find at pp. 351, 352, substantially the same remarks.

But perhaps Sir John may have written rather too near to our time to render it altogether certain that his countrymen did not adopt it from ours without acknowledgement.

Well then, let us come down to England. In *Forbes' Agriculture*, written somewhere about 1778, we meet with this passage at page 638 in the description of an agricultural implement:—

"This is a turnwrist, or turnrest, and by some called a turn-ridge plough. It turns the furrows all one way, laying the land level, without ridges or parting furrows; and in sideling or sloping grounds, where the descent is too great for the cattle to draw the plough up and down the side of a hill, and too steep to turn the furrows up against it, this plough performs the tillage very well, the cattle drawing it *across the descent*, it turns the furrows downwards, or with the descent. It differs from the swing-plough in the mould-boards, which in this plough are *double and moveable*."

From this, it appears that the hill-side plough at least, is no novelty. In a still earlier work, *A New System of Agriculture, &c.*, a small duo-

decimo by an anonymous author, published in 1755, the following remarks occur:

"I can't introduce a very useful observation in a more proper place than this; and that is, when the land you are to plough is the side of a very steep hill, as it often is, 'tis down-right madness to proceed, as most countrymen do, by ploughing directly up and down the steep. In this case, 'tis pity the driver is not in the place of his team; he would then, perhaps, discover that 'twould be the wisest way to plough *across the hill*, by which means the cattle would not only draw with the same ease as if they worked on plain ground, but the furrows lying athwart would prevent the rains from washing down the fatness of the soil with every flood—a misfortune to which at present they are yearly liable, and often ruined and impoverished by it."

I cannot but think that a person familiar with the improved, as contrasted with the up-and-down mode, if he had never heard mooted the question of its origin, would in the above passages, recognize his old acquaintance. Possibly, however, there may be yet room for doubt or objection, as we have here only ambiguous terms. Ploughing "across" or "athwart" a hill may not stand precisely for ploughing "horizontally." It may mean ploughing in a straight line, without reference to inequalities. Be it so. Let the furrow proceed straight across, climbing the swells and jumping the ravines, till it reaches the other side of the field; (though this interpretation will scarce hold water more than the furrow it represents,) or let it ramble like a sheep—(though a sheep walk on a hill-side is not so badly graduated after all—) still let us see if we can find no evidence less equivocal. What says the great father of modern husbandry? We present an extract from his "Chapter on Ridges."

After urging the importance of laying dry the soil on the hill-sides, (which in England are very liable to be saturated with water,) he speaks of two modes of effecting the object. First, by *covered* horizontal trenches, which he objects to as expensive and yet not permanent; and then suggests that—"tis a better method to plough the ridges *across* the hill almost *horizontally*, (*ma foi!* here's the very word)—that their parting furrows lying open, may each serve as a drain to the ridge next below it; for when the plough has made the bottom of their horizontal furrows a few inches deeper than the surface of the clay, the water will run to their ends very securely, without rising into the mould, provided no part of the furrows be lower than their ends.

"These parting furrows and their ridges must be made more or less oblique according to the form and declivity of the hill; but the more *horizontal* they are, the sooner the rain-water will run off the lands; for in that case it will run to the furrows, and reach them at right angles, which it will not do when the ridges (or lands) are oblique; and therefore the waters' course across the land will be longer. Every one of these *horizontal trenches* receives all the water from the rills, or little gutters wherein the water runs betwixt the mould and the clay. These are all cut off by the trenches which receive the water at their upper sides, and carry it away, as the trunks of lead placed under the eaves of a house do carry away the rain-water."

Tull's Husbandry, p. 243.

In a note to this passage he says, "The natu-

ral course of water being downwards, it would always run by the nearest way to the bottom of the hill, if nothing stop it. But the water runs from the hill in two manners; viz. upon the surface of the staple, and upon the surface of the clay that is under the staple; that which runs under, keeps its straight course from the top to the bottom of a hill, under a ridge that is made exactly with the descent of the hill, except that part of the water that rises up into the mould and a very little that soaks into the furrows; for when the furrows are not made exactly with the descent, the more oblique they are to the descent, the longer will be the water's course under the ridges, and the shorter, as they are nearer being at right angles to the descent. 'Tis also the same with the water that falls upon the surface of the ridges; for the more horizontal they are, the shorter its course will be from them to the furrows, which carry it off; and the less of the water will sink into the ridges, the less oblique and the nearer to right angles to the descent they are made."

Here we have the whole *rationale* of this improvement. A little after, he says, "Many hundred acres of good ground are spoiled, and many a good horse, in ploughing against the hill, and against all reason, demonstration, and experience too."

If asked to ascend still higher for evidence, we might call old Columella into court. "In ploughing," he tells us, "it must be especially observed, that the furrow be always drawn *across* the hill; for, by this method the difficulty arising from the acclivity of the ground is surmounted and broken, and the labor both of men and cattle is commodiously lessened."—Book II. Chap. IV.

This may suffice, although additional testimony might be cited from Darwin's *Phytologia* and the *Complete Farmer*, and perhaps others.

Now, is it possible to believe that Gov. Randolph, with the multifarious learning of which he enjoyed the reputation, had never read any of the above works?

The truth, I take it, is about this. England and the United States are essentially different in many of their respective agricultural circumstances, products and wants. England is a foggy, dripping country—where showers are frequent, but rarely so violent as with us. Here, we have frequent storms and torrents. Again, the soil of England is particularly adapted to grass, and being filled with vegetable fibres, is little disposed to wash. I need not say how differently we in the south are situated. There, they have no crop like our maize, set in ridges wide apart, with the plants separated in those ridges—and the broad interval constantly stripped of foreign growth; but their drill crops are either roots or pulse, which lying close together, help to prevent the bursting of the beds by the force of the water. Their object then in making the horizontal beds, is rather to drain the steeps by tapping the oozes and drawing the water into the furrows: ours, rather the preservation of the soil, and the retention of all requisite moisture, while that which is superfluous is suffered to flow off.

To Gov. Randolph then, be the praise of its *introduction* and *adaptation* to our peculiar circumstances. Title enough this, to our lasting gratitude. But let us not be putting "claw's leather" on the dead, lest some future critic, more uncere-

monious than a Virginian from state-pride would naturally be, should endeavor to strip him even of his own proper plumage.

A case-hunter is not always a good lawyer—so you must not conclude from this “bristling of inverted commas” that I am therefore, a *learned*

FARMER.

REPLY TO J. M. G. ON PUTRESCENT MANURES.

To the Editor of the Farmers' Register.

March 10th, 1835.

When my confessedly crude ideas on putrescent manures were submitted to the consideration of the readers of the Farmers' Register, [No. 8, page 497,] I expressed the wish that others would join in the discussion, and bring their aid to correct errors, or to diffuse light. This wish was uttered in good faith: and therefore it was with pleasure that I saw that another writer had come forward—and still more so, that it was one whose signature had often been seen attached to communications in which I always found something either interesting or instructive. My anticipations of deriving both profit and pleasure from his views of this subject, were not disturbed by the strictures which his prefatory remarks promised to myself—and I was prepared to receive my rightful share of correction and reproof, without flinching or complaining, even though applied as sharply as J. M. G.'s keen sense of the ridiculous, and talent for satire, so well qualified him to inflict. In his treatment of the general subject, I found some interesting views, and still more valuable facts, which I will advert to hereafter: but in his treatment of my communication, I was both disappointed and surprised, that J. M. G. should have made strictures at such length, and yet have directed them exclusively against mere words and phrases—passages, which are so unimportant to the general tenor of the arguments and statements, that every one assailed might be yielded to his mercy, or to be dealt with at discretion, without the substance or matter of my views being affected by the loss. But personally, I have no cause to regret the adoption of this course. The applause which he has lavished on my communication in general, is much beyond its due, and is certainly a most abundant offset (if any was required) for his fierce attack upon a few words, so unimportant as scarcely to be worth a defence. Nor would I defend them, but for the respect, which in common with so many of your readers, I entertain for the signature of J. M. G. I therefore hope to be excused for occupying so much space, with matters so little deserving notice, upon the ground that the subjects of controversy are not of my choosing, and that I shall act strictly in self defence. I feel no temptation to exceed these limits, nor to use the liberty offered by J. M. G. of treating his arguments in the manner which he has thought proper to adopt. I agree fully with him in condemning the vitiated public taste, which has been “spiced” with personal controversies, until it palls upon, and rejects mere argument and search for truth: but I differ from him entirely as to the propriety of that vitiated appetite being ministered to, by those who desire its cure—and above all, in an

agricultural or scientific journal. I proceed to consider the objections of J. M. G. in their order.

“The first of his assertions,” says J. M. G. (page 640) “from which I must dissent, is that which he has italicised, or thrown into the form of an antithetical axiom. Since he seems to design it as a kind of corner-stone to much of his superstructure, it merits particular examination. ‘Facts,’ (says he,) ‘the causes of which are not understood, are not truths, and serve only to mislead us.’” That this position is neither

literally nor universally true, my opponent then shows at length, and most satisfactorily and triumphantly, and uses both the force of logic and of ridicule, to demolish this unlucky little sentence.

Unlucky not more for its writer than for its critic, for it is here *mis-quoted*—inadvertently, I am very sure—but yet thereby so changed, as to make his ground of objection, and the force of his syllogism much the stronger. He has changed “facts misunderstood” to facts “not understood”—and between *not understanding*, and *misunderstanding* operations and causes, there certainly may be great differences. Correct this mistake, and though the sentence may still be very faulty, yet so much of the point of J. M. G.'s syllogisms would be lost, that it may be safely inferred, that he erected them upon his mistake. But even after correcting this error, I am ready to admit, that the intended meaning of this sentence, (if taken alone) was not so fully expressed—so guarded with exceptions and provisos, as to be safe from cavil, or even free from solid objections—though if taken in connexion with the paragraph of which it forms a part, its intended meaning could scarcely be misunderstood. It was not deemed necessary to be thus guarded at all points, because the sentence was a sort of condensation or abridgement of the purport of the preceding sentences, and is explained by them. The mind of the reader, would scarcely fail to supply its imperfect form and sense, what will be here placed in brackets: “Facts, the causes [or mode of operation] of which are misunderstood, are not truths, and [often] serve only to mislead us.”* In this sense, obvious I think, (except to hyper-criticism's microscopic eye,) I am as ready to defend the truth of the expression, as to admit its unimportance and uselessness.

If any illustration is wanting of the meaning and truth of the passage in question, it is presented (and on this very subject of manures) in your remarks, Mr. Editor, on the piece which preceded mine. You have there shown (page 497) that the mixture of quicklime with putrescent manures, serves to hasten, and may increase greatly the early effects of the latter. Those who have known this “fact” by experience, but who “misunderstood” the cause of this early increase, would naturally be led by it to a false conclusion, and to found a practice thereon altogether wrong and unprofitable. To such misunderstanding the fact was not a *truth*, but served to lead to dangerous error. But he who has learned the cause of this fact, will not take it as a guide to follow, but as a warning to avoid that practice, which to others

*The reader who may refer to the passage (page 498) is requested to correct a typographical error—instead of “carry the result,” it was written “vary the result.”

would serve, undoubtedly, both profitable and correct.

But J. M. G. was not content to overthrow this sentence in its admitted weakness: he gives it first a factitious importance, of which I had no thought, by calling it more than once an "axiom," as if I had dignified it with that term, and speaks of it "as designed as a kind of corner-stone for much of my superstructure." So far from this being the case, nothing whatever rests upon this "corner-stone"—and if it had been used to erect conclusions on, it would only have been necessary for him to point out the connexion, after having kicked away the corner-stone, and let the whole superstructure tumble. An axiom is a self-evident proposition, so simple as not to require, and scarcely to admit of proof: and if I had maintained that the truth of this condemned assertion was as evident as that "a part is less than the whole," (which would have been necessarily implied in declaring it an axiom,) then my opponent might indeed have had good ground to denounce and deride so absurd a position. But though neither of these grounds assumed by J. M. G. can be maintained, I am content to yield what *may* be made good, viz: that the sentence in question was not expressed clearly, nor in the best manner—nor as deliberately weighed as an important matter would have been, before being uttered—and that indeed it is worthless, and has served no purpose whatever, except as a suppositious "corner-stone" for J. M. G.'s syllogisms, and to produce all this "much ado about nothing." In fine, I heartily repent me of my two lines, and again ask the reader's pardon for having preached so long upon a text of so little worth.

The second objection urged by J. M. G. is to the following passage (p. 501.) "Raw meat and vegetables contain more nutritive matter for the human stomach than after the loss necessarily sustained by their being cooked; yet the remainder, after this process, is [better] fitted for the sustenance of man, and therefore is more valuable than the whole was before the change, and the waste caused by cooking." This, (whether right or wrong,) was stated merely as an illustration of the undoubted fact then under consideration; and the main force of argument is brought by J. M. G. to bear, not on the proposition as to the necessary preparation of manures, but upon the illustration—leaving the substance to pursue the shadow. J. M. G. needs not to be informed that an undoubted truth may be attempted to be sustained by mistaken facts, and therefore false evidence—and that the exposure of such evidence, does not serve to overthrow, or weaken, the proposition, from whose support it is taken away. As there is the most abundant proof that the far greater proportion of all vegetable matters must in some way or other, pass through the fermentative process, (and not the less so on J. M. G.'s plan, than on any other,) to be prepared to act as food for plants, I might, as before, yield the illustration used, as not at all wanting to sustain the position. I readily confess that my knowledge of animal physiology, as of logic, is almost nothing, and I should neither be ashamed, nor unwilling to be corrected in any erroneous views, entertained and expressed because they were supposed to be undoubted truths. But neither does this confession, nor my high sense of respect for my critic, require me to

yield the opinion that cooked food is more suited to the digestive powers of man, than raw meat, vegetables, or grain. Such rare cases as he mentions as contradictions to my assertions, even if not "misunderstood," (and therefore presenting what I have called false facts,) would simply be exceptions to the general laws of digestion, which every man knows from his own observation and experience, admit of numerous exceptions and violations. Yielding to J. M. G. that Nebuchadnezzar ate grass for several years without damage—that gourmands may not seem to lose fat by eating beef so raw that the blood follows the knife—that most stomachs (not *all* however) can, without apparent injury, admit raw salads as a small part of their food—and that Dr. Beaumont's wounded soldier actually digested raw cabbage with uncommon ease and rapidity—all these, and a thousand such facts would not overthrow my very unimportant assumption (that is, unimportant to the discussion of the operation of manures,) that cooked food is better suited to sustain man, than raw.

But even if the many striking and notorious exceptions did not exist to the digestive powers of the human stomach, the facts adduced by J. M. G. could have no weight, unless raw food was used altogether by the individuals brought forward—and of this there is no case, excepting the first one named. In all others that are adduced by J. M. G., and in all that can be adduced in the history of men who have made even a single advance above a brutish state, the use of cooked food is the general habit of every individual, and that of raw food, form only partial and very limited exceptions. To give his argument any weight as to any modern and well known examples, enough persons must be confined altogether to raw food, to be compared with, and to prove its being as nourishing as if cooked. The case of Nebuchadnezzar is certainly a strong support to J. M. G.'s argument. He did not eat "raw vegetables" only, which might be considered as roots and salads—but "he did eat grass like oxen," as is thrice stated in holy writ. But a miraculous and special exercise of God's just, but temporary vengeance on offenders, is surely altogether unfit to be cited as an example of the ordinary course of the laws of nature. If Nebuchadnezzar's experience is a fair proof that grass, or even raw food of any kind, is equally nutritious for man as cooked food, it would be an equally admissible and sound argument, to prove by the case of Jonah, that all chemists are mistaken in supposing that man's life cannot be long sustained without some change of air in breathing. But I will contend no farther—and willingly leave the decision of this question to the opinions of either the learned in physiology, or of those as plain and ignorant as myself.

"The last of J. B.'s assertions," says J. M. G. "against which I beg leave to enter my dissent, is that wherein he speaks of the coarse manure of our farm-pens, composed, in great part, of corn stalks. Of this he says, among other assertions, that 'every corn-stalk serves as a flue or chimney, to carry off the gases which are evolved.' Now, unless there are such things as flues and chimneys stopped at both ends, which can still carry off such subtle vapors as gases—or corn-stalks without joints, of which I have never yet heard—this last assumption is equally

"untenable with the others which I have taken the liberty to examine. Even admitting that every corn-stalk was a firm, hollow tube from end to end, before it could act as 'a flue or chimney,' one end at least must be higher than the other, and the lower end not stopped up with earth, (as it must be, if below the earth,) but open, and sufficiently near the ground for the atmosphere to force into it whatever is expected to pass upwards through it."

Now, if every term of comparison or phrase, is to be so measured, and adjusted with mathematical precision to suit the ideas intended to be conveyed, J. M. G. might have named yet stronger objections to my comparing the corn-stalk to a chimney, and might have denied the correctness of the comparison, because the corn-stalk does not have the various parts essential to a chimney; of "vent," "throat," "flue," "shaft," &c., as described by a writer in your March number. If all J. M. G.'s sentences and assertions were tried by his own standard of precision, many would be found as incomplete, and as liable to such objections as mine: and if he will take care to avoid liability to be visited by this kind of word-catching criticism, he must entirely abandon his usual flowing and happy manner of expression, and adopt instead, the style of the statute book—studding and entangling his periods with all the exceptions and provisos that can be thought of—or take as a serious model, the parentheses within parentheses, presented in Gen. Charles Lee's amusing letter concerning his leather breeches.

My saying "flue or chimney," I supposed would plainly enough indicate a passage by which any aeriform fluid could escape, if evolved in contact with one end, and the other end was either out of the earth or less deeply covered by the plough. But this agency is denied to the corn-stalks unless each was a "hollow tube." To the force of this objection I must "beg leave to dissent." The allusion made was not to unbroken stalks, but to the unrotted stalks after having been trodden by cattle—in which state there are not many that have escaped being mashed, and numerous artificial cracks thereby made along the greater part, or whole of their course, through which any fluid might escape, and much more easily a highly elastic and compressed gas. But admitting all that is improperly claimed for the solidity and impenetrability of corn-stalks buried by the plough as manure—even supposing each to be as solid and close as glass or metallic rods, similarly placed—still the loose mould could not so enclose them as not to leave channels or flues for the easy passage of air along the outside of the stalks; and wherever a stalk protruded from the soil, or came very near the surface, an outlet would be offered—and even if the stalk was lying horizontally, such a channel, of four or five feet in length, would certainly communicate with some fissure leading to the surface. These effects might well take place without one end of the flue being higher than the other, and notwithstanding the closest possible stopping of the ends of the stalks by loose mould.

Only these three objections, which have been considered, are named by J. M. G. as "what appear to be the faults of J. B.'s communication"—and whether I have succeeded in removing them, or that they remain in full force, I may venture to assert, and call on your readers to witness, that there

has yet appeared no material or important difference in our opinions—and our controversy might serve as an example of what slight differences of opinion on unimportant points, may lead to dispute, and to angry dispute, if both parties are not as willing to bear and forbear, as I believe that my highly respected opponent is, and as I am sure of for myself.

For the balance of J. M. G.'s communication I have only to repeat my acknowledgements for his praises, with which I have ample cause to be content—and to correct some misapprehension of my meaning into which he seems to have fallen. When he proceeds to express his own opinions, on the action of manures, and to discuss *things* instead of weighing mere *words*, the subject becomes more worthy of his pen—and every reader, as well as myself, will find more pleasure in accompanying him through his argument, whether the opinions expressed, may be approved or not. It is solely with the view of aiding the discussion, and removing some mistakes of my own expressions, that I proceed with this communication, and with my quotations—and not because I have the slightest personal objection to any of the expressions on which I may comment. Nor is it deemed necessary to reply to various jeers and flouts, which are afterwards made to apply to some of the three objections already answered.

J. M. G. seems to have considered me as the advocate for the universal practice of fermenting winter-made manure in heaps. I certainly incline to the opinion, that in most cases such would be the preferable course, *provided every known means is used to guard against waste as much as possible*. That such waste occurs—and under the usual bad management to an enormous extent—both my former communications testify strongly—and not only from theory, but also from experiment. It is not a question between fermenting and not fermenting manure, (as it is often held to be)—but between fermenting in heaps—in the farm-yard without heaping—or after being applied to the fields. Act as you please, fermentation must take place—and until it does take place, far the greater part of the manure must remain insoluble, inert, and possibly injurious. That mode of using manure will be the best which will permit the least waste of the results of fermentation, and of course offer the most to the use of growing plants. I am not altogether opposed to the hypothesis of J. M. G., that the earth attracts and retains these results; but my belief goes only to a certain extent—and that falls far short of all the products of fermentation from a heavy coat of manure—or even from a lighter dressing on soils badly constituted to retain manures. Surely J. M. G. has had experience of the escape and loss (in some way) of so large a part of certain heavy dressings of manure, as to leave little, if any clear profit, from what was saved. Indeed, his own report of the striking and valuable experiment of summer cow-pens ploughed, and proving greatly inferior to others equally manured, and not ploughed, is enough to show that the earth cannot retain these products of fermentation. I referred particularly to general facts of like kind, (page 502) and gave sufficient reasons, deduced from the theory of fermentation, why cow-pens ploughed in summer should lose more of their manure than when not ploughed. The reasoning was satisfactory to my

mind. J. M. G. does not notice this—nor does he attempt to reconcile the admitted waste of fertilizing principles which occurs, with his hypothesis of the earth having power to attract and combine with all the products of fermentation. He says elsewhere, and very truly, that no covering can confine the expansive forces of gases. I readily agree, that if suddenly evolved, and in quantity, they would scarcely require my "flues" for their passage to the upper air—and that his "elective attraction" of the soil would as little serve to retain their entire volume. But growing plants would probably take up the earlier products of fermentation, so as not to permit them to reach the gaseous state—and even a very slow product of gas might be retained in the soil either by mechanical or chemical means, until the growing plants could use it as food. But without growing plants—and especially in case of summer cow-pens—the retentive power of the earth would not suffice for but a small part of the manure ploughed in. On this subject, I beg leave to refer J. M. G. to my previous explanation of such facts, in the piece on which he has commented, (and his own cases present by far the strongest and most satisfactory examples,) and to examine whether my theory of the loss of manure is not more accordant with his facts, than his own view of the attracting and retentive power of soil.

In agreeing with J. M. G. to the power of soil to attract and combine with (not the whole but) a certain amount of the matters left on, or ploughed under its surface, I must remark that I do not arrive at that conclusion by the same course of reasoning with himself. This however is enough to say—for it is not my object, nor wish, in this reply to assail his positions, but merely to defend my own. It is proper, however, that I should state something of my reasons for the waste of fertilizing principles, even in the manuring processes of nature, the deposit of leaves, and other vegetable matters left to rot on the earth. J. M. G. correctly traces the process of nature in restoring lost fertility to the earth, to that limit where I suppose that process to end, and that waste to begin, which he absolutely denies, and the belief in which he treats with ridicule. If my opponent resides in, or near, Lower Virginia, I presume that he either owns, or is acquainted with some bodies of virgin wood land, which are too poor to be worth clearing or cultivating. If he does not know such land, many of your readers certainly do. On the poorest of this wood land, the leaves have been falling and rotting for 4000 years at least—and nothing has been taken by man or beast from the land, except scanty and rare crops of acorns, by the hogs. Now according to J. M. G.'s theory of the manuring process of nature—and the impossibility of any of her gifts being lost by natural means, (which he treats more as a question of morals than of chemistry,) I should suppose that the inevitable result would be, that this land would be as rich as the Mississippi bottoms—or at least as rich as it is possible for dry land to be made by putrescent manures—and as this is directly contrary to the known facts, I should be glad to learn how the facts and his theory can be reconciled. I do not treat of the earth and atmosphere as "sentient and moral things," nor do I decide by the measure of the moral wrong—or by the enormity of thus preferring against nature a

"slandrous charge of grand or petty larceny" committed on the earth. I simply refer to these facts, of the annual additions for countless ages of fertilizing matter, and that scarcely enough has been fixed in the soil to redeem it from sterility.

There is another point from which I infer (though perhaps incorrectly) that J. M. G. thinks our views opposed, viz: as to the propriety of applying manure to the surface. Though my experience of this mode of application to land under tillage has not been altogether satisfactory, there is nothing in the practice opposed to, and much in support of, my theoretical views formerly stated. This certainly would appear from the reasoning offered as to the ploughing of summer cow-pens—and the consideration of surface manuring from the farm-yard was not there considered, because, though written out, my continuation of the subject was postponed for a future time, and to wait for the views of others to be presented. I will merely here observe, that I most decidedly approve, by experience, of applying rotted manures on the surface of wheat in the winter and spring, and of unrotted manure to clover intended not to be grazed or mown.

The experiment stated by J. M. G. on this subject, (of unrotted manure applied on the surface) is more interesting and decisive than any that I could have offered, and it is gratifying that this discussion has added that to the valuable facts on this subject. If the propriety and economy of surface manuring can be established in all cases, it will certainly serve to remove much the greater part of the fears and the known waste from the fermentation of manures. For though the fermentation on the surface (soon or late) is as certain to occur, as below, or in the dung-hill—still it would be slow, and its first soluble products would be washed into the earth nearly as fast as formed, and used immediately, if growing plants were present.

J. B.

For the Farmers' Register.

MEMORANDA OF THE LAST WHEAT SEEDING.

A long periodical absence in the autumn, and occasional absence at other times of the year, prevent my keeping a regular journal, as do some of my more systematic friends. The plan which I have adopted does not secure all the advantages which that presents, but it does secure some of them; and is convenient on the score of reference. I have a note book in which I make occasional memoranda of the most interesting operations—the amount of crop produced and sold, and other statistics of the farm; together with such reflections as may offer from time to time. The different subjects are entered in detached paragraphs, and the heads are put opposite in marginal columns ruled on the left of each page. By passing the eye hastily down these columns, the subject sought is easily found.

For the perusal of young farmers, among whom I am sorry I cannot now number myself, I give you, along with other matter, the substance of a few notes relative to the late rather difficult seed-time—late in more senses than one, and not a little difficult in this neighborhood, to those at least who had much low and moist ground, as was my case. In the middle country, on the contrary, I

understand the season has been favorable. The retrospect will, I trust, not be entirely useless. I shall state what I did right, and what wrong, that the former may be imitated, and the latter shunned. And here permit me to remark, that farmers cannot always regulate their management by any set formula, but must vary it according to the varying seasons and circumstances. A friend of mine, residing on the Pamunkey, has this year sown his large crop of eight hundred bushels of wheat, in the month of October. His corn having been destroyed by inundation, the land was replanted and worked late. It was of course clean and loose; and by passing a heavy harrow once on a corn ridge before sowing, and several times afterwards, and then opening the furrows between the beds, the wheat was expeditiously, and I do not doubt effectually, gotten in. Were this attempted in ordinary seasons, when, owing to the early laying by of the corn, the land might have become consolidated, and a considerable growth of grass have ensued, a failure of the wheat crop would be the probable consequence. I refer to this by way of illustration.

I returned home on the 10th of October, after an absence of nearly two months. The weather had been exceedingly wet from the 1st of September. The fodder was all more or less injured, and even at that late period, not all gathered—the corn fields were covered in the rich places with luxuriant grass, and in the low places soaked with moisture, not likely soon to evaporate under the heavy vegetable coat. At seed time my corn fields are usually very clean; but truth requires it to be stated that, owing to the small quantity of hoe work I bestow, they are not particularly so at any other time, except at planting—when I give them the best preparation possible, and take care to have them deeply and thoroughly broken, to which, and the improvement of the soil to the utmost extent of my means, is to be ascribed my modicum of success as a corn grower. But I am sowing wheat and not making corn: that subject I will more fully treat of in a future number. On my arrival, I immediately caused the hands to desist from gathering the tattered and sapless corn blades, and commenced my preparation for sowing, already too long delayed. I have generally found my fallows, when sown very early, more liable to the depredations of the fly; and for that reason, as well as to give a better chance to the corn ground, always more or less exhausted by the previous crop, I commonly begin with it: and having in the mode described in a former number of the Register, (Vol. I. p. 577) detached the bottoms, I sow them first, when practicable. This year it was not so, and I therefore began on the high land. The shock beds were sown and harrowed before the corn was set up on them, to avoid the necessity of harrowing around the shocks. These shock beds are more or less distant from each other, according to the heaviness of the crop, usually 40 corn rows apart; and two or three are always prepared ahead to receive the corn. In all my operations I endeavor to expand the work, so as not to have the hands and teams crowded, but at the same time to keep them sufficiently together for supervision. It may not be amiss here to observe, that after sowing, in hauling off the corn to house it, the carters are directed to run one wheel exactly in the water-furrow, so as to cut up as lit-

tle wheat as possible. If the corn is luxuriant, and time permits, the stalk is commonly cut off at the ground with one stroke of the hoe, and the stubble divided in two at another.

On the 17th of October, thinking the bottoms dry enough to venture, we commenced on them, but had soon afterwards a Sabbath day's rain, not so restricted in quantity as a Sabbath day's journey in length, which long put these places, and for a day or two, all other places, out of condition. This interval was employed in gathering the corn on two twenty acre lots, in which, and some neighboring pasture ground, the work oxen were turned with great advantage. Being afraid that I should not get all the wheat sown in good time, I resolved to turn my attention to the fallowed land, as soon as I supposed the ground was in order. A part of it had been broken up with three-horse, but much the larger part with four-horse ploughs, which left wide and deep finishing furrows. In the softer and cleaner places, I found it practicable to get the wheat in with some stout harrows, the plan of which I received from a very judicious farmer in Fauquier. They are heavy implements, and only of occasional use in this part of the country, in preparing the most rugged land, and in putting in small grain on fallows. Then followed the seedsmen, and were in turn succeeded by the linked harrows,* each going once in a place, and lapping well. Finding that too many of the grains skipped into the wide and deep water-furrows, I passed a large triangular harrow once before sowing, immediately over the furrows, which loosened the edges of the beds, and intercepted the grain in its downward progress. On the wheat coming up, the borders of the beds not so served, were found much thinner than the rest, though as the evil was soon discovered, not many beds were in this situation. Farther experience showed that the X ploughs,† under the pressure of heavy weights, and drawn by two horses, first on one side and then the other of the furrows, would have answered still better. The beds in most of the land under consideration, are sixteen feet wide. Three bouts of the Fauquier harrows were necessary to finish them. There being, however, a deficiency of those implements, and finding that by running the double-shovel ploughs once exactly on the crowns of the beds, two bouts would suffice, we thenceforth pursued that plan. Subsequent observation convinced me that here too the X ploughs would have been a good substitute, the shovels *drilling* the wheat too much, at a single operation. The wheat on the edges of the beds previously loosened by the triangular harrow, was sufficiently covered by the linked harrows, and by the earth thrown out by the water-furrow plough. On most of the fallowed land besides, the wheat was ploughed in with the double-shovels, which were run just so near the water-furrows as not to cast the earth into them. The edges of the beds were prepared and the seed on them covered in the

* These are light square harrows, two of which are linked, so as to run the one nearly after the other. Each has twenty straight teeth.—Ed.

† This is a kind of cultivator, the wooden frame in which the five small hoes are inserted, being crossed in the form of the letter X.—Ed.

manner before mentioned. Fearing that some of the hardest of the land that was shovelled had not been sufficiently broken by them, I placed heavy weights on the X ploughs, and went over it again, the light harrows following and smoothing it nicely. With this double operation I was entirely satisfied: it was effected in less time than it could have been with the single ploughs. On a small portion of the fallowed land (the hardest and foulest) thinking a turning-plough necessary, I put in the wheat with one-horse, and in a very few cases, with two-horse ploughs: but here the work went slowly on. Luckily there was but little so to be done. By thus adapting the implements to the nature and preparation of the land, great despatch was obtained. The whole operation was completed by opening the cross drains and chopping over, where necessary, with the hoes.

Some time having now elapsed, I determined to return to the bottoms in the corn field; intending to plough and grip the wetter spots, and let them lie unsown until in good, or at least in better order. This was partially, and I regret not more extensively done, as I was tempted, much to my regret afterwards, to sow some too wet, from an apprehension of rain; though no one can be more sensible than I am of the impropriety of cultivating land on the principles of brick-making. At this advanced season, land ploughed and gripped, and left exposed to the action of the sun and air, will dry more in one day, than in many days if allowed to lie unbroken under a thick coat of grass. I would, however, only recommend it late in the fall, when time becomes precious, and the ground is not likely, if let alone, to get in order, nor so apt to bake. By lying thus, previously to being sown, the loose earth on the surface dries and forms a warm and friable bed for the reception of the seed. I wish it however to be understood, that this is only proposed as a resort in case of necessity. If the sun has power enough to dry the earth without such aid, it will certainly be preferable to let it lie undisturbed.

The beds in the bottoms were formed by the union of two corn rows; and to raise them more, the first four furrows were thrown up with three-horse ploughs. In the foul condition of the bottoms, it would have been preferable to have ploughed them throughout with four horses, which would more thoroughly have subverted the luxuriant grass, have formed higher beds and deeper water-furrows, and from such large ploughs being less likely to be choked and otherwise obstructed, would have involved very little, if any, loss of labor. It may be laid down as an axiom, that the cheapest implement is that which is exactly adequate to the object in view. Could I control the order of succession in which the several portions of land should be sown, it would be as follows: 1st. The low and wet valleys, for greater security against frost and moisture. 2dly. The hill-sides, that the wheat plants, while the weather was still warm, might grow quickly, cover the earth, and bind it together to prevent, with the assistance of deep ploughing and graduated drains, injury from hasty showers. And 3dly. The elevated plains, not likely to be washed or drowned, or affected by frost. I endeavor to put a fourth more seed on low than on highland of equal fertility, and a proportionately larger quantity on stiff than on light land; and the seedsmen alter their

hands according to the varying quality of the soil. The quantity of seed too, should increase with the advance of the time of sowing. A bushel in October is considered equal to five pecks the corresponding day in November. For the more regular distribution of the seed, I usually harrow before sowing. A very successful farmer of my acquaintance, who was in the habit of giving but two harrowings, preferred that one should precede the sowing. When cross harrowing is practicable, this preliminary operation is unnecessary, as that prevents the wheat from being drilled along the furrows. I much prefer it when it can be done, which, owing to the shortness of the turns, and filling up of the water-furrows, is rarely the case.

A word at parting, on the preservation of seed wheat. It should be cut ripe, thrashed early, and kept dry, in a secure place at some distance from the thrashing room. Soon after the introduction of the famous white flint, then in great request, I had several hundred bushels of superior quality, which was put in a loft immediately over the machine. Some of the other wheat being smutty, the subtle poison ascended, and thoroughly infected the fine sample above, though lime had been put with it. I have now a well floored and well ventilated room in the roof of a detached building, appropriated, for the time, exclusively to the seed wheat, which is well cleaned, spread 18 inches thick, and occasionally examined and stirred. I have never in a single instance, had wheat, of my own saving, that failed to vegetate well, though I have bought it.

To some of your readers, parts, or indeed, the whole of this article may appear neither novel nor important, but I will remark that I write for the unlearned, not for the learned. What is familiar to one man may be new to another; and the assumption of the contrary does much to obstruct the diffusion of agricultural knowledge.

A PLANTER OF THE LOWER JAMES.

ON THE EFFECTS OF HEAT ON SOIL.

To the Editor of the Farmers' Register.

Fife's, Goochland, March 7, 1835.

In a communication signed John Robert Wallace, found on page 618 of the March No. of the Register, is the following observation. "Heat is the great destroyer of the vegetative or nutritious principles of the earth." Then follows an illustration: "make the richest earth" says he, "into bricks, then pulverize them, and you will find that seed will not sprout in the dust," &c. I know it has often been brought forward as an objection to the fallowing of lands in summer, that the heat of the sun killed them. Still, facts to the contrary appear, which may lead at least, to a few inquiries. I would humbly submit to Mr. Wallace some difficulties that lie in the way of his proposition, and illustration. I could, for example, select lands in the torrid zone, exposed to the heat of a vertical sun, and producing large crops, notwithstanding the frequent stirring in the hottest time of the year. How is this if the sun kills the nutritious principles of the earth? Again, if a farmer will fallow a field for wheat in summer, his stirring that field often does not destroy its vegetative principle. If he plough one-half of it twice, and the other half of it three times, he will find the

best crop on the land thrice ploughed. I could give here a reason for this, but I wish to be short, and only state some of the difficulties to the theory "that heat is a great destroyer of land." If I were going to select a farm, I should doubtless prefer one that lay well to the sun, or that had a southern aspect. Some persons have supposed that covering land so as to preserve it from the heat of the sun is the cause of its producing: this seems to be the opinion of Mr. W. "Take a piece of plank" says he, "12 inches square—place it on a gall; let it remain for one year, and then sow seeds on the place covered by the plank, and on the conterminous earth, and you will find the plants on the space covered by the plank, much more vigorous than their neighbors," &c. That this will be the case, does not prove that the exclusion of heat is the cause. It may be observed, that the ground under such a covering as that, becomes loose, consequently is penetrated by all that is enriching in the gases—and not being exposed to baking rains, is always ready for this food which nature provides so liberally. The conterminous earth is hardened by exposure without culture. For example, let a road run through a rich piece of land, and in proportion as it is trod by man or beast, will its sterility appear. One way to bring it to produce would be to cover it, as this would doubtless loosen it in time. Another way would be by culture, and the better it was broken up the sooner it would return to its original state.

Again he says, "make the richest earth into bricks," &c. It may not be in the burning of the rich land that the nutritious principle is destroyed, but in the preparation for burning, viz. making it into mortar first. Let Mr. W. take rich earth in a dry state and calcine it, and scatter it on his land, he will not only find it sprout seed, but bring it to perfection—especially if there be calcareous earth: and he would find the ashes valuable in proportion to the quantity of calcareous earth. On the other hand, if he will take even lime itself, (I mean slaked lime,) and make it into mortar as bricks are prepared, and then burn it, he will find it lose its virtue almost altogether. His reasons for fall crops not injuring lands equal to spring and summer crops, do not fully satisfy my mind. Oats injure lands, I humbly conceive, for other reasons than he gives. And now for my theory—or shall I call it theorem, for it is well established. *Stirring land wet is the greatest destroyer of good land imaginable.* When land is put in oats it is too often the case that it is stirred wet in the spring, (so it is with corn land) and this produces sterility, and is ascribed to oats, when the blame lies somewhere else. Again, the seeds of weeds which ripen in fall, and are scattered over the surface of the earth, and often have vegetated at or before the time of ploughing for oats, consequently they are turned under and destroyed, and there being no more seed to cover the earth after the oats are sown, the land is thus left bare when the crop is taken off, which leads to the conjecture, that oats impoverish land. The weeds on the wheat land grow from seed not disturbed in the spring, and accounts for the abundance of them on wheat lands in the fall. If land then was ploughed at the same season for oats as for wheat, and only harrowed in the spring, there would be more weeds left on oat land: and if oats would stand

the winter and be put in when wheat was, we should have as many weeds after oats as wheat.

I hope nothing I have said will in the least give offence to J. R. W., with whose communications I have been very much pleased. I would be understood as suggesting a few things for farther consideration only, and not as a critic. If a person were to take a quantity of clay (I mean clay that has at least one-tenth calcareous earth in it) and calcine it, it will become a fertilizer of the soil; but if you take the same kind of clay and make it into mortar and calcine it, you will find it useless.

JAMES FIFE.

From Burnes's Travels in Bokhara.

NEW METHOD OF CROSSING A RIVER.

The mode in which we passed the Oxus was singular, and, I believe, quite peculiar to this part of the country. We were drawn by a pair of horses, who were yoked to the boat, on each bow, by a rope fixed to the hair of the mane. The bridle is then put on as if the horse were to be mounted; the boat is pushed into the stream, and, without any other assistance than the horses, is ferried directly across the most rapid channel. A man on board holds the reins of each horse, and allows them to play loosely in the mouth, urging him to swim; and, thus guided, he advances without difficulty. There is not an oar to aid in impelling the boat; and the only assistance from those on board consists in manœuvring a rude rounded pole at the stern, to prevent the vessel from wheeling in the current, and to give both horses clear water to swim. They sometimes use four horses; and in that case, two are fixed at the stern. These horses require no preparatory training, since they indiscriminately yoke all that cross the river. One of the boats was dragged over by the aid of two of our jaded ponies; and the vessel which attempted to follow us without them was carried so far down the stream as to detain us a whole day on the banks, till it could be brought up to the camp of our caravan. By this ingenious mode we crossed a river nearly half a mile wide, and running at the rate of three miles and a half an hour, in fifteen minutes of actual sailing; but there was some detention from having to thread our way among the sand banks that separated the branches. I see nothing to prevent the general adoption of this expeditious mode of passing a river, and it would be an invaluable improvement below the Ghats of India. I had never before seen the horse converted to such a use; and in my travels through India, I had always considered that noble animal as a great incumbrance in crossing a river.

From the Horticultural Register.

ON THE CULTIVATION OF ASPARAGUS.

Having had considerable experience in the cultivation of asparagus, and been so far successful as to raise it nearly two inches in diameter, or between five and six inches in circumference, some of which I exhibited at the Massachusetts Horticultural Society, in the spring of 1833, and which obtained the Society's premium for the largest and best asparagus: having, also, for several years past sold in Quincy market from seventeen to twenty-five cents the bunch, when the same sized bunches of the common kind were selling from six to ten

cents, I am induced at this time to inform you and the public of my method of growing this delicious vegetable. I sow the seed in the same manner and time with blood beets in the spring, preparing the ground in the same way, as the young or seedling plants will thrive in soil that will grow good beets. I generally sow, and think it the best way, one row of beets and another of asparagus alternately, one foot asunder, which brings the beet rows two feet apart, the proper distance for this vegetable.

As asparagus makes a very small growth the first season, it will not in the least interfere with the beet crop; on the other hand, I think it is rather an advantage to the growth of asparagus, as the large leaf of the former serves to protect the weak and slender shoot of the latter.

The nature of the plants likewise differs so materially, one having a long tap root, calculated to draw deep from the soil, the other very small fibrous roots, which invariably, in this plant more than any I have observed, draw juices from the surface; in this case neither draws food from the other, as is apt to be the case when different vegetables, of the same habits and wants grow near each other.

The second season after sowing it will be necessary for the asparagus to occupy the whole ground, the rows being two feet apart, a very proper distance; as the plant makes a large growth the second year, they may stand in the seed rows within an inch of each other. By the above method I have raised from 2 to 5000 roots a year which I have sold.

In choosing and preparing the ground for putting down an asparagus bed, as it is called, I select a piece of ground that has been under tillage the year previous; a sandy loam if I have it; if not, I add sand, the washings of roads or other materials, to bring it as near the nature of the above named soil as possible. I then plough very deep if the soil will admit, 10 inches or more; cart on and spread about twenty cart loads of manure, or in that proportion to the acre. I prefer fresh or unfermented horse manure for this as well as for most other crops. After this, cross-plough not quite so deep as before, and trench furrow by running a plough both ways, in the same furrow, four feet apart; clear out the trenches with a shovel ten inches deep and one foot wide at the bottom, throwing the earth into ridges between the rows as even as possible; lastly, I draw in from the sides of the trenches a small quantity of fine earth, about one inch deep, levelling it with the hoe as it is drawn in, and the ground is prepared for planting. It is very important that the roots should be taken up carefully and exposed as little to the sun and air as possible previous to planting. My method is to start them from the seed bed and put them under cover or into the cellar as soon after digging as possible; then part the roots, which come up in bunches, snarled together, cut off the fingers (so I name the roots) that are broken and ragged and pack them away in meadow moss until I am ready for planting, which is performed as follows: The roots are taken to the field in a basket, packed in moss, and lifted out as you plant, placing them in a straight line on the bottom of the trench, from twelve to fourteen inches apart, taking hold of the crown of the root and pressing it gently down, carefully spreading the roots or

fingers horizontally in every direction, as the roots of asparagus naturally grow horizontal—and the fibres or feeders extend upwards to the surface; this I ascertained by examining a bed that had been hoed after cutting time, in June, immediately before a smart shower. The surface of the earth was literally covered with small white fibrous roots. As the bed was situated at the brow of a large hill, a part of it was gullied by the water in one or two places below the main roots, where I had a fine opportunity to examine both roots and fibres. There were few, if any fibres two inches below the main roots, notwithstanding that the bed was put down according to the old method, deep trenching, and filling in six inches below the roots with good rotten manure, which I found safely deposited in rather a decomposed state, having laid several years without being disturbed either by roots, fibres, worms, or weather. It is necessary for a man to follow immediately after the one that places the roots in the bottom of the trench, who has some skill in the use of the hoe; moving backwards, taking care to step each side of the roots in the trench, so as not to disturb them, and with his hoe scraping from each side of the trench regularly, so as to cover the crown of the roots about three inches; and the planting is completed. A field or bed managed in this way has a handsome appearance the first season, if the ridges are kept neat and in a workmanlike manner. Between the rows of asparagus on the top of the ridges, I usually grow a very fine crop of tap rooted plants, which does not in the least injure it the first summer.

After the asparagus shoots have made their appearance about six inches above ground it is a good plan to draw a little earth around the stalks about an inch deep, so as to kill the weeds, which may be repeated in the course of the season without injuring the row of roots on the ridge. The second year after planting, as soon as the frost is out of the ground, spread along in the trenches, which will then be three or four inches deep, about one inch of light compost manure; then with a plough back furrow every row separately, turning the furrows directly over the asparagus, making two bouts to a row, rake or cross harrow, and the bed will be level, requiring no more care that season except keeping down the weeds. The third spring, as soon as the weather permits, burn the old stalks on the ground, spread at the rate of twenty cart loads per acre, of good compost or horse manure, and plough it in, taking care to turn narrow furrows and not so deep as to injure the crown of the root; then rake or harrow, and the bed will be in readiness for gathering, or cutting, which should be done in the following manner: As soon as the shoots project five or six inches above the ground, and before the buds begin to open, cut them off with a knife about one inch or less below the surface of the ground; (not three or four as is recommended by some theorists,) as all that grows below the surface is stringy and tough and not fit to eat. The old stump immediately decays, and makes the best of food for the plants. I continue cutting, about two months from the time I begin in the spring, having no regard to the twenty-first day of June, or any other particular day, as the plant naturally produces a given quantity of shoots every season, without injury to the root.

The above method should be pursued yearly, as long as the bed lasts, which in this climate, I presume will continue to produce well from thirty to forty years, under the above treatment. The bed that produced the large shoots I spoke of, was put in 1819; in 1833, the season I sold my farm, the produce was equal, if not superior, to any former year.

Yours, &c.

D. CHANDLER.

Thompson Island, Feb. 9, 1835.

From the [British] Quarterly Journal of Agriculture.

ON THE POTATO.

By MR. ROBERT S. M'ADAM, read before the Belfast Natural History Society.

It is singular, that although the potato is now so widely diffused among civilized nations as a staple article of food, its history, and the time of its introduction, are wrapped in great obscurity. Five and twenty years ago, Sir Joseph Banks made a number of interesting researches on the subject, and published the result, under the title of "An attempt to ascertain the time of the introduction of the potato," which proves that even he had not arrived at certainty. This work I have not met with;* but, after a search through a great number of other sources, I have been able to collect the following particulars.

In the beginning of the sixteenth century, I find that the *Spanish sweet potato*, a species of *Convolvulus*, was common in gardens over Europe. It was first introduced into Spain from the West Indies, and bore the Indian name of *Battata*. There is also a possibility of its having come to Europe from the east, as it is a native both of India and China. Old Gerard, the English herbalist, gives the following account of this plant in his usual quaint style. "This plant," says he, "which is called *Sisarum Peruvianum*, or *Skyrrists* of Peru, is generally by us called *Potatus* or *Potatoes*. There is not any that has written of this plant, or said any thing of the flowers; therefore I refer the description thereof unto those that shall hereafter have further knowledge of the same; yet have I had in my garden divers roots that have flourished unto the first approach of winter, and have grown unto a great length of branches, but they brought not forth any flowers at all. The roots are many, thick, and knobbie, like unto the roots of peonies, or rather of the asphodill, joined together at the top into one head, in the manner of the skyrrit, which being divided into divers parts and planted, do make great increase, especially if the greatest roots be cut into divers gobbets, and planted in good fertill ground. The potatoes grow in India, Barbarie, Spaine, and other hotte regions, of which I planted divers roots (that I bought at the Exchange in London,) in my garden, where they flourished until winter, at which time they perished and rotted. The potato roots are, among the Spaniards, Italians, and many other nations, common and ordinary meate; which, no doubt, are of mighty nourishing parts, and do

strengthen and comfort nature; whose nutriment is, as it were, a meane between flesh and fruit, though somewhat windie; but, being roasted in the embers, they do lose much of their windiness, especially being eaten sopped in wine. Of these roots may be made conserves, no less toothsome, wholesome, and daintie, than of the flesh of quinces. And likewise these comfortable and delicate meates, called in shops *Morselli*, *Placentula*, and divers other such like. These roots may serve as a ground of foundation whereon the cunning confectioner or sugar-baker may worke and frame many comfortable delicate conserves and restorative sweet-meats. They are used to be eaten roasted in the ashes; some, when they be so roasted, infuse them and sop them in wine; and others, to give them the greater grace in eating, do boil them with prunes, and so eate them." These sweet potatoes were long used in England as a delicacy, and were imported, in considerable quantities, from Spain and the Canary Islands, being supposed to have the peculiar property of restoring decayed vigor in men. The famous *kissing comfits*, so much in vogue in Shakspeare's day, and with which our ancestors were imposed upon, as we are by universal pills, and other modern omnipotent remedies, were made principally of these and eringo roots. Falstaff says in the *Merry Wives of Windsor*.*

"Let it rain potatoes and hail kissing comfits."

I shall only mention further, with respect to this plant, the *Battata*, that it grows abundantly in Jamaica, Barbadoes, and the other West India islands, and that it is propagated, not like our potato, but by slips. The pounded or grated roots make excellent puddings and cakes; and, when mashed and fermented, a cooling and refreshing drink is made from them, called *Mobby*, somewhat resembling small-beer.

The potato now in use, the *Solanum tuberosum* of botanists, according to the Spanish historians, was found in cultivation on the first arrival of the Spaniards in Chili and Peru. Peter Cieca informs us, in his Chronicle, published in 1553, that the inhabitants of Quito, and its vicinity, have, besides maize, a tuberous root which they eat, and call *Papas*. Molina, in his Natural History of Chili, vol. ii, quotes the authority of several ancient writers to prove that the plant is indigenous there. He describes two species or varieties, the one wild, and with small bitter roots, the other, the one under cultivation; but appears to consider both to have been the same originally—cultivation rendering the wild plant sweet and succulent, exactly as in the case of our carrot. The Spaniards having introduced these roots into their own country, did not retain their Peruvian name, but from their similarity in nature to the sweet potato already in use, called them also *Battatas*. From Spain they were carried into Italy, where they were known by the same name as *truffles*, *taratouffi*. The first European writer (after those alluded to,) who takes any notice of them, is the famous German botanist Clusius, who mentions having received two roots, in the year 1588, while residing at Vienna, from the Governor of Mons, in the province of Hainault; who, it seems, had himself procured them from the attendant of the Pope's legate, un-

*It forms art. 2. in the first volume of the Transactions of the Horticultural Society of London, 1805. Ed.

*Act V. Scene 5.

der the name of *Taratouffi*. He gives a plate of it among his rare plants. So much for its introduction on the Continent of Europe.

In the year 1584, Sir Walter Raleigh, under the authority of a patent granted by Queen Elizabeth, for discovering and planting new countries not possessed by Christians, sent out a number of colonists to Virginia. Now, although no absolute proof can be brought forward on the subject, yet, from concurring circumstances, and from tradition, it appears highly probable that the potato now in use amongst us was first brought to Ireland, either by Sir Walter himself, on his return from his voyage, or was afterwards sent to him by the Governor of Virginia. The general opinion is, that he had them planted in his own garden near Youghal, in the county of Cork. He is said to have given them to his gardener as a fine fruit from America, and ordered them to be put down in his kitchen garden. In August the plants flowered, and in September they produced their apples; but these were so totally different from what the gardener had expected to see, that, in a fit of ill humor, he pulled them and carried them to his master, asking him "were these the fine American fruit?" Sir Walter either really was, or pretended to be ignorant of the matter; and, having tasted them, told the man to dig up the weeds and throw them away. The gardener did so, but was astonished to find about a bushel of tuberous roots. Trial soon showed that this was the eatable part of the plant. The only written proof we have of the introduction of the potato by Raleigh, is found in the manuscript minutes of the Royal Society of London, December 13, 1693, when we are told the president, Sir Robert Southwell, informed the fellows that his grandfather first cultivated potatoes in Ireland; and that he got them from Sir Walter Raleigh. They were cultivated a long time in Ireland before they were known in England, and they were only at last introduced there by the shipwreck of a vessel containing some of them, on the coast of Lancashire, at a place called North Meols, which is still famous for their cultivation. Gerard, whom I have already quoted, describes them distinctly from the sweet potato, and calls them *Virginian Potatoes*. He says, "I have received roots hercof from Virginia, otherwise called *Norembega*, which grow and prosper in my garden, as in their native country. The Indians do call this plant *Papus* (meaning the rootes,) by which name also the common potatoes are called in those Indian countries."

We have thus seen the same plant brought from South America by the Spaniards, and from North America by the English. Now, it is remarkable, that, at the conquest of Mexico, in the reign of Montezuma, the potato was quite unknown in that country. How is it, then, that a plant belonging originally to the southern hemisphere should be found at the foot of the Alleghany Mountains, while it was unknown in the intermediate country, Mexico? Humboldt is the person who agitates this question. He proves satisfactorily that the potato is not indigenous in Peru, nor found wild in any part of the Andes situated under the tropics; no where, in fact, but in Chili, from which place we may conjecture it to have been propagated northwards under the government of the Incas. Again, he proves the improbability of the potato having been brought to North America by any of the Peruvian tribes, both from

physical and moral causes; and, combining this with the above mentioned singular fact respecting Mexico, he starts a new idea, that the English colonists of Virginia themselves procured the plant from the Spanish settlements. "The colony," he remarks, "was in existence from July 1584. Now, the navigators of those times were not in the habit of steering straight westward to reach the coast of America; they were still in the practice of following the track indicated by Columbus, and profiting by the trade-winds of the torrid zone. This passage facilitated communication with the West India Islands, which were then the centre of Spanish commerce. It appears, then, natural enough that the English themselves brought potatoes from South America into Virginia. At the time when they came from Virginia to England, they were common both in Spain and Italy. We are not then to be astonished, that a production, which had passed from one continent to another, could in America pass from the Spanish to the English colonies."*

From all these different considerations, conjoined with what I have already brought forward of the history of the plant, I think we are almost warranted in concluding that Chili alone is the native country of the potato.

We may now, in a cursory manner, glance at its subsequent history in these countries. The next writer after old Gerard who mentions it is Lord Bacon. Speaking of ale, he observes, "If ale was brewed with one-fourth part of some fat root, such as the potato, to three-fourths of grain, it would be more conducive to longevity than with grain alone."† The potato still appears to have been only cultivated in gardens as a curious plant. It was considered a great delicacy in the reign of James the First. In the year 1619 we find it mentioned as one of the articles provided for the use of the queen's household. The quantity procured was very small, and the price two shillings a pound.‡ In the following reign, and during the continuance of the Commonwealth, the potato remained equally scarce. Its cultivation, meantime, spread slowly over Ireland, and still more slowly in Lancashire. The first time that it was brought before the public as an object of national importance, was at a meeting of the Royal Society held in March 1663, when the letter was read from Mr. Buckland, a gentleman of Somersetshire, strongly recommending the culture of potatoes in all parts of the kingdom as a precaution against famine. This was referred to a committee, and upon their report, the thanks of the Society were given to Mr. Buckland, all the members who had lands were entreated to plant them, and Mr. Evelyn was directed to mention the matter at the end of his "*Sylva*," a book then publishing under the auspices of the Society.|| These exertions of a scientific body do not seem to have produced much effect, and as a late writer remarks, "if we may judge by the opinions which were published respecting the plant, we must conclude, that the necessities of the poor of Ireland (who have always been left too entirely to their own resources,) did more to promote the cultivation of potatoes, than all the

*Nueva Espana.

†Bacon, Nat. Hist.

‡Eden on the State of the Poor.

||Birch, History of the Royal Society.

labors of the learned, and the philanthropy of the patriotic.* In books of gardening published towards the close of the 17th century, potatoes are spoken of in no very high terms. "They are much used," says one writer, "in Ireland and America as bread, and might be propagated with advantage to poor people." Another says, "I do not hear that it hath been yet essayed whether they may not be propagated in large quantities for food for swine and other cattle." The famous nurserymen, London and Wise, have not considered the potato worthy of a place in their *Complete Gardener*, published in 1719; and several other writers speak of it as far inferior to radishes! This was more than 100 years after its introduction. One reason, certainly, that the plant remained so long in disrepute, was the defective mode of its culture. The early planting and late raising of the potatoes, very much injured their quality. This and ignorance of the proper mode of cooking them, would make them certainly any thing but a tempting article of food. The following anecdote illustrates this. "A person who had been invited to taste the first potatoes planted in the County of Forfar, about the year 1730, related that the roots had been merely heated, and that they adhered to the teeth like glue, while their flavor was far from agreeable. The food was about to be condemned through the ignorance of the cook, when the accidental arrival of a gentleman, who had tasted a potato in Lancashire, caused the rejected roots to be remanded back to the hot turf ashes, till they became as dainty as they had before been nauseous."

According to the old *Statistical Account of Scotland*, potatoes were first cultivated in the fields there, in the year 1739, in the County of Sterling; and Dr. Walker assures us that they were not known in the Highlands and Isles till 1743. It is stated in the *General Report of Scotland*, (vol. ii. p. 111) as a well ascertained fact, that "in the year 1725-6, the few potato plants then existing in gardens about Edinburgh: were left in the same spot of ground from year to year, as recommended by Evelyn: a few tubers were perhaps removed for use in the autumn, and the parent plants well covered with litter to save them from the winter's frost." Notwithstanding the success that after this period attended the culture of the potato among the cottagers, its progress among the higher classes in Scotland was retarded by the opinions of the different writers on agricultural subjects, already mentioned: and also, what is not a little singular, a mistaken zeal in religious matters made some of the Scotch folks hostile to the innovation. "Potatoes," said they, "are not mentioned in the Bible;" and this was deemed quite a sufficient reason for rejecting them. Famine at last gave the great impulse to the cultivation of this root, and during the latter part of the 18th century, it gradually spread over the country, and its excellent qualities became generally understood.

I shall not occupy your time by tracing its progress through the various other countries of Europe. I may merely mention that the Netherlands received it from England; and that from thence it found its way into different parts of Germany. It was very late before it came into general cultivation in Sweden and Denmark, and even

Saxony, but in all these countries it is universally used at present. In Switzerland potatoes seem to have been introduced about the year 1720; they now form a principal article of food there. Poland is perhaps as remarkable as Ireland for their extensive cultivation. Of late years they have been introduced into the British settlements in India, and, as Bishop Heber remarks, "with great prospect of success. Many places have been found suited for their culture, and though the Hindoos at first were unwilling to adopt the use of them, their prejudices have been gradually overcome, and potatoes may some time hence rival rice in its general utility among them." "It is only within these forty years that any particular attention has been paid in France to the cultivation of potatoes. They were long regarded as an unwholesome plant, and only fit to be eaten by cattle and the most wretched of human beings. It is probable that the French had only cultivated the inferior sorts, and did not know that better kinds could be procured. Parmentier, so distinguished by his zeal for chemistry, was the first who made any successful exertions in behalf of this decried and unpopular plant. He thought that the best plan to introduce it into general use was to make it popular with the higher orders. For that purpose, in 1785, he presented Louis XVI. with a nosegay made with the flowers of the potato, and the sovereign graciously received the emblem of a plant, the most likely of any, to guarantee his subjects against the horrors of famine. This ingenious mode of bringing a plant, which had hitherto been so much despised into fashion, was eminently successful. The courtiers, always ready to flatter the taste and wishes of their monarch, hastened to cultivate an article honored with his regard: and thus France, in a great measure, owes the more extensive culture of potatoes to courtly flattery."*

To give a description of the potato plant in an Irish assembly, would certainly be an unnecessary undertaking; with equal reason, I might begin to describe a shower of rain, for both must be as familiar to every one as the light of day. My remarks, therefore, on this part of the subject shall be very brief. The potato, because it grows under ground, has been usually called a root, but improperly. It more nearly resembles a kind of under ground fruit; and, in conformity with this idea, the French have given it the name of *pomme de terre* or ground-apple. The potato, in fact, belongs to the class of plants called tuberous-rooted, or those having roundish knobs intermixed with the fibres, which constitute the real roots that draw nourishment from the earth. These tubers or knobs have been considered as so many under ground stems, enlarged by a deposition of farinaceous matter; and when, by any chance, they lose while growing their covering of earth, and continue to grow exposed to the light, they assume the same green color as the rest of the plant. But I am rather inclined to consider them as a mode of increase analogous to the viviparous production of a part of the animal kingdom; while the seed or apple from the flower corresponds to the oviparous propagation of birds. Tuberous-rooted plants, therefore, are furnished by nature with a two-fold mode of increase. The potato,

*Library of Entertaining Knowledge.

*Sir John Sinclair.

besides, may be considered a perennial plant, as it may continue to spring up for many successive years on the same spot. It belongs to the genus of plants called *Solanum*, many species of which, such as the nightshade, are extremely poisonous. In Jamaica, the root of one species is a violent purgative, and a spoonful or two is used by the natives as a dose. It might startle a person at first to find the principal food of a large portion of mankind, particularly our own countrymen, drawn from a vegetable belonging to so poisonous a group. Two circumstances also would seem to prove that a portion of deleterious matter does actually exist in the potato. One is, that potatoes, whether in their parent bed or in the pit in which they were preserved after being dug up, if they are uncovered, *take the wind* (as it is called,) and become unwholesome food for men, occasioning sickness, and greatly disordering the body. They are easily known by being of a different color from those of the same crop which lie at a greater depth. These surface potatoes, however, may be used as seed, and besides are not unwholesome for pigs. The other circumstance is, that the liquid contained in raw potatoes must contain some matter hostile to *animal life*, as cattle and hogs have been greatly injured by drinking of the water in which they have been boiled. To counterbalance this, on the other hand, a distinguished agriculturist maintains that substances noxious to *animal life* are generally beneficial to *vegetable life*; and with regard to the juices of the potato in particular, that they contain various substances favorable to vegetation, which may be rendered of great use in the irrigation of grass lands.* These two facts are the only ones which the experience of two hundred years has discovered to furnish an objection to the use of the potato; and when I shall have laid before you the long catalogue of advantages derived from its introduction among us, I am persuaded they will be considered as mere trifles. The danger is obviated simply by being known. In different quarters of the globe, whole nations subsist on roots which are deadly poison in their unprepared state, but which become safe and nutritious when cooked by fire. The most remarkable examples of this are found in the natives of the Molucca and Society Islands, and the Indians of South America. In the island of Hayti, the juice of the very root which is used when dressed in the same way as we employ the potato, has been often swallowed by some of the miserable natives to put an end to their existence. Oviedo relates, as an eye witness, that these unhappy wretches, who, like many African tribes, preferred death to slavery, united together by fifties to swallow at once the poisonous juice of the *Jatropha*.†

All vegetable productions affording food are found to contain, in some proportion or other, a farinaceous or granular substance devoid of fibre, which, when dried, may be ground or pounded into flour or meal; and which, if boiled in water, will form with it a pulpy matter. The vegetable substances which contain most of this matter are seeds and tubers, these parts of the plant being intended by nature to contain a store of food, as it were, for the young germ, sufficient to nourish it

until the production of members or instruments capable of collecting nutriment for it after its exclusion, precisely analogous to the provision of yolk laid up in the egg of a bird for the young being enclosed in it. From accurate chemical examination, it has been found that in every 100 parts of the potato, there are about 70 parts of water and 30 of potato-meal, which is a powder of a grayish color, having the taste of the raw root. This meal being submitted to further analysis, is found to be composed of three different substances. 1st, starch or *fecula*, 16 parts; 2d, leafy or fibrous matter, 9 parts; and 3rd, soluble mucilage, 5 parts. The potato also contains a very small portion of potash, and a few other substances, such as oxides of iron and manganese, common salt, &c., but in such minute quantities as not to affect the general statement I have made. An essential oil likewise exists in the potato, which gives its taste, but this is also very trifling. The composition of the potato root is extremely similar to that of the seeds of wheat and maize, though, from the dissimilarity in taste and external appearance, this would not be at first suspected; and hence arises the corresponding fitness of all three for food. The principal difference between wheat and potatoes consists in the presence of a substance called *gluten* in wheat, which strongly resembles animal glue, and which is the cause that wheat, rye, and barley are the only kinds of grain of which loaf bread can be made; this *gluten* giving tenacity and firmness, while it at the same time promotes the fermentation in the making of bread, as well as gives it its taste. In potatoes, oats, beans, peas, rice, maize, buckwheat, &c., this is entirely wanting, and therefore they must be mixed with a certain quantity of flour before they can be made into bread.

There is perhaps no species of food that can be consumed in a greater variety of ways than the potato. Among us the only modes in use are three or four, such as boiling, roasting, or frying; but our French neighbors, who surpass us and all the world in every thing relating to cookery, at least so far as infinite variety is concerned, have several other ways of preparing this root. A French gentleman invited to dinner thirty-two of his friends, promising to each a different dish, and yet all composed of the same material. They assembled, found before each seat a cover, and, upon taking their seats, discovered that each guest had really a different dish, though all formed of eggs! One of the company immediately repeated the invitation to all the persons present for next day, when he promised to regale them in a similar manner, on another single substance metamorphosed into thirty-two different forms. They came and dined very comfortably on thirty-two distinct and palatable dishes all composed of potatoes! Boiling is the simplest, cheapest, and perhaps most nutritious mode of cooking the potato. When boiled, the nourishing substances contained in it are taken into the stomach, more intimately diffused through about three times their weight of water, than is the case with any artificial mixture of the potato-meal and water. Hence the easiness of digestion and lightness of this root above almost all other farinaceous substances equally nutritive; while its cheapness, and the ease with which it can be cooked, are great arguments in its favor with the great body of the peo-

* Sir John Sinclair.

† Humboldt.

ple. Every one knows that, simple as the process of boiling a potato appears, there is really a peculiar art or dexterity required; and it is often remarked, "that good potatoes are less frequently to be seen at the tables of those who keep professed cooks than in the wooden bowl of the peasant." But the fact is, that in the one case there is only one dish to attend to, whereas in the other there are many, and that the potatoes of the cottager are consumed *hot from the fire*, as soon as they are ready, which is not the case in the other instance. Next to boiling, roasting the potato is the mode most employed; but this is exceptionable, as the root retains in it much of that black unwholesome liquid which I have already mentioned. This resides principally in the skin, and hence those persons who have been tempted to eat the roasted skin, have been often seriously disordered by it. Custom, however, is found to render the stomach callous to its effects, as is evident from the practice of the children of our Irish peasantry. Throughout all the country it is usual, as every person must have observed, to allow the little children in every cottage to *roast potatoes* for their own use, as often as they please, in the turf ashes. As you ride by a cabin, you frequently see a group of children run to the door, each holding in his hand a roasted potato.

The limits of a paper such as the present, will not permit me to enter into many interesting topics connected with my subject. I must omit entirely giving any details respecting the culture of the potato, its varieties, or the various diseases to which the plant is liable, though on all these a vast number of curious and ingenious experiments have been made, and, I may add, whole libraries written. I shall pass over the various advantages derived from the use of it in feeding the different kinds of domestic animals, one remarkable consequence of which is the vast increase of the Irish pork trade. I shall likewise omit all mention of the beneficial effects produced on the lands of this country by the cultivation of the plant, merely reminding you that it is one of the great instruments by which our bogs are reclaimed; and I shall now proceed to lay before you some of its uses which are less obvious and more seldom described.

The first manufactured ingredient derived from the potato was starch. This substance, formerly obtained from wheat alone, was first discovered in the island of Chios, in the Grecian Archipelago, and was in common use among the Romans. The potato starch is made by the simple process of grating the roots into clear spring water, when it separates from the other particles, and sinks to the bottom. It is a very remarkable circumstance, that in *frosted* potatoes, it is only the *juice*, or liquid part of the root that is affected, and not at all the farina or flour, which may be equally well extracted, and will be found as white and good as if it had not been frozen, provided the root is not quite rotted, which in process of time it will become. The following singular illustration of this took place in 1794: a field of potatoes at Camstradden, in Dumbartonshire, was laid under water, by a sudden rise of Lochlomond. A quantity of these was got up, and in part brought home. Being wet, they were laid on the floors of out-houses to dry; but in a few days they were so spoiled as to be unfit for feeding cattle. A heap of the potatoes was left on the ground; when turned

over next spring, some starch was found at the bottom, which excited a suspicion, that though the root had been affected by the frost, yet that the flour had remained uninjured. This was found to be the case; and a quantity of the farina was collected from the heap, part of which was distributed in Dumbartonshire, and the remainder was brought to Stirling, in 1804. As arrow-root had become fashionable about that time, it was often used as a substitute; and many eat of it without knowing the difference. In 1825 a dish of it was made with milk, and two gentlemen who supped on it, declared that they would not have known it from arrow-root. A specimen of this same flour of 1794 was sent to Sir John Sinclair in 1826, and it seemed as good as any produced from the potatoes of that year, after having been kept for above thirty years.* Potato-flour is very easily converted into jelly, in the same way as arrow-root, by gradually pouring into it some boiling water, and stirring the mixture about; and in this shape it is strongly recommended as food for invalids, sometimes being taken with a little milk and sugar. With the addition and thorough mixture of a little wheaten flour, or ground rice, while it is boiling, it forms a pleasant and nourishing diet either with or without milk. It is well known that the manufacture of bread, even when conducted by the most skilful and experienced bakers, is sometimes very difficult. From the various casualties to which wheaten flour has been liable, from disease in the crop, or bad management in the keeping or grinding of the grain, it frequently loses some of its most essential qualities, and causes the bread, in defiance of the baker's art, to contract a sourness, which is both disagreeable to the taste, and prejudicial to health. Fortunately a remedy has been discovered of late years; that of mixing with the flour a small quantity of *potato-starch, previously converted into a jelly*. This kind of bread is remarkably light, and keeps longer moist than other bread. It toasts much better, and makes better bread puddings. Another most important use to which potato-flour can be applied, is to give it, boiled in milk, in the proportion of two spoonfuls of flour to one pint of milk, to young children, brought up by hand, and not at the breast, or after they are weaned from the breast. In this country a great quantity of starch is consumed in making what is called the *dressing* for weaver's webs. Until of late, this was entirely made from wheat, and still a great proportion of it is so. But if potato starch were universally adopted for the purpose, as is the case now throughout France, a very great consumption of wheat would be saved. This substance is also put to another use, namely, the making of size, which, for some purposes, such as white-washing, is greatly superior to common size, as it has no offensive smell, and has a more durable whiteness.

The next useful product derivable from the potato is one which, before the days of chemical knowledge, might justly have been considered as wonderful as the conversion of lead into gold, promised by the alchemists: I mean *sugar*. The discovery by chemical analysis, that the potato, though far different in form, taste, and all external qualities, was perfectly similar in component parts to the different kinds of grain used for the food of

* Sir John Sinclair.

man, led naturally to inquiries, whether the products derived from these grains, by submitting them to different chemical operations, might not be procured also from this root. Complete success was the consequence. It was found, among other things, that a substance, possessing all the properties of sugar, though differing a little from that of the sugar cane, could be procured by a simple operation from the potato. Until lately, however, the discovery was considered only as a matter of curiosity, and was mentioned only among men of science. Two years ago, experiments were tried, on an extensive scale, in the United States of America, to ascertain whether, in districts where the potato grows abundantly, this sugar might not be made advantageously both to the population of the district, and to the manufacturer himself. I have seen an account of the process, and the results, which are very interesting. The potatoes were ground by a very ingenious and simple method, by exposing them through a box or hopper to the action of a wooden cylinder, having nailed upon it long strips of iron punched full of holes, to give them a rough grating surface. This cylinder was driven by a band of leather attached to the drum of a water-wheel. On filling the hopper with potatoes, and giving the grater the necessary motion, the potatoes were reduced with surprising rapidity to a fine pulp, from which, by the aid of a sieve and water, the starch, in great purity, was readily obtained. This apparatus ground 3500 bushels of potatoes without the least repair. The starch thus obtained was then dissolved completely in water, heated by steam let into it. A certain quantity of sulphuric acid, or vitriol, was then mixed with it, and heat being applied, the whole of the starch was converted into syrup. This was purified from the acid by adding quicklime, and then evaporated; when the result was an excellent sugar fit for all domestic purposes. A bushel of potatoes, weighing 60 lbs., gives 8 lbs. of pure dry starch; and from these 8 lbs., $7\frac{1}{2}$ lbs. of sugar are obtained. This sugar ferments briskly, when made into beer, and yields a healthful and pleasant beverage. It will be of most use, however, for making sweetmeats, and may be used at table in place of honey, for which it is a good substitute. It has already become a great favorite with most persons who have become acquainted with it. Its taste is that of a delicious sweet, and as an article of diet it is probably more healthful, and less oppressive to the stomach, than any other sweet substance in use.* Potatoes (as I find from the account of a traveller,) are used extensively in the eastern part of Russia for making treacle, which is quite as sweet and good as that which we obtain from the tropics, but having less consistence.

As all substances containing saccharine matter are capable of producing ardent spirit, we would naturally be led to expect, from the foregoing remarks, that it might be procured from the potato: and such is the fact. In 1747, experiments on the distillation of brandy from potatoes were made in Sweden, and the result was so favorable that it was proposed to substitute them in a great measure for grain. In England Dr. Anderson was the first who obtained spirits from this plant, and the account which he published of his operations

is very interesting. The potatoes were boiled to a pulp, bruised, and the skins thrown away. Water was then added, and a great quantity of yeast mixed with it. In twelve hours it fermented, and this was kept up by occasional stirring for a fortnight. The liquor, which was now slightly acid, was distilled, and, from 72 lbs. of potatoes which had been used, was obtained a gallon of pure spirits considerably above proof, and a quart more below proof. "This," says the Doctor, "was in every respect the finest and most agreeable vinous spirit I ever saw. In taste it somewhat resembled brandy, but it was more mild than any brandy I ever tasted; and had a certain kind of coolness on the palate peculiar to itself, by which it might be readily distinguished by a nice judge from any other kind of spirit. Its flavor more nearly resembled brandy impregnated with the odor of violets and raspberries, than any thing else to which I could compare it. A single glass of it put into a bowl of rum punch, made it appear as if it had consisted half and half of rum and brandy, impregnated with the juice of raspberries. It seemed to derive its flavor from a subtle essential oil of a very singular kind." "I have been at great pains," continues the Doctor, "to describe this kind of spirit in its state of perfection, because I have since heard of and seen some spirits said to be drawn from potatoes, which, from want of skill or caution on the part of the operators, were intolerably nauseous."* It has been supposed, as I before remarked, that, with proper management, potatoes might form a cheaper material than barley to extract spirits from; and accordingly, I find, that, at present, in the Isle of Guernsey, there is a distillery where they are used with success; and, in 1821, there were actually in Paris twenty distilleries for extracting brandy from the potato starch, and nearly as many more within a circle of eight leagues round it. In 1822 these were all put a stop to, for some reason connected with the revenue laws, and I cannot learn whether they have since been resumed.†

The next product of the potato is a kind of *cheese*. The manufacture of this is carried on in Thuringia and Saxony, and it has the advantage of retaining its freshness for several years, provided it be kept in close vessels. It is prepared by boiling the potatoes, and reducing them, when cold, to a pulp, rejecting the skins. Sour milk is added, or else sweet curd with the whey pressed out, in the proportion of a pint to five pounds of pulp. It is kneaded several times, drained in small baskets, and simply dried in the shade.‡

In some parts of Germany potatoes are put to another use. The lower classes are accustomed to incorporate them, after being steamed and reduced to a paste, with the butter to be spread over bread. It thus goes farther where economy is studied: and that it may longer be preserved, is often salted.§

It will surprise many to learn, that a mode has been suggested by a French chemist for converting potatoes into a substance resembling coffee. He mixes some best olive-oil with a certain portion of dried potato-flour, and then adds a small quan-

* Silliman's Journal.

* Bath Society Papers.

† Sir John Sinclair.

‡ Ibid.

§ Ibid.

tity of coffee-powder. He asserts that this will produce a liquor more agreeable than coffee.

Chemical ingenuity has likewise converted this most useful root into substitutes for many other articles; as chocolate, tapioca, and vermicelli. The use of potato starch instead of arrow-root, I have already mentioned; and much of it is at present sold under the name of arrow-root, and, in France, under that of *fécule de pomme de terre*.

A chemist in Copenhagen has discovered that the flowers of the plant may be used in dyeing. By this means a beautiful yellow color may be obtained, which is solid and durable. By plunging the color into blue, it becomes a perfect green. It has likewise been found, that the juice contained in the potato will produce a gray color of great beauty. The liquor drawn off in the process of making potato-starch will clean silks, woollens, or cottons, without damage to the texture or color. It is also good for cleaning wainscots.

Potatoes are used with excellent effect in the boilers of steam engines, for preventing the gathering of a calcareous incrustation on the bottom, which is gradually deposited from the water employed. The potatoes give out a glutinous substance which entangles the particles in the water, and prevents them from incrusting the iron of the boiler.* A medical use of the potato has been lately suggested in a valuable French publication; namely, as a preventive of, and even cure for the scurvy. Roasted potatoes were administered with perfect success to sailors afflicted with the disorder, after other approved medicines had been given in vain. As roasted potatoes are the most effectual, it seems probable that the remedy depends on some of the substances contained in the black liquid which boils out of potatoes, and which is retained in roasting.

I have now described the various uses to which these valuable roots may be applied. I have shown, that from them may be procured bread, starch, jelly, sugar, treacle, beer, brandy, cheese, butter, coffee, tapioca, dye-stuffs, size, cleansing liquids, and medicine. I may close the catalogue by an account taken from a work published in 1710, upon the virtues of herbs. The author, after mentioning that potatoes make very good food for man, either boiled, baked, or roasted, when eaten with good butter, salt, juice of oranges or lemons, and double refined sugar, then goes on to speak of the virtues of what he calls the blood of potatoes. For the mode of preparing this valuable ingredient, he refers his readers to the description of the method of extracting a similar blood from parsnips. After reducing them to a pulp, he mixes them with crumbs of white bread, and sprinkles them with white port wine: after sundry distillations (which need not be recited here,) "the matter is changed," says he, "into a rubicund or bloody chyle." This is to be forced out strongly with a press, and the juice exposed to a variety of operations, "till the blood becomes quite clear, and of a most perfect red." "From this," he continues, "you may, if you please, separate, by an alembic, a thin and clear liquor, so you have remaining in the bottom the blood of potatoes of a very glorious color! It hath all the properties of the roots boiled, baked, roasted, or made into bread, puddings, or broth. It invigo-

rates to a strange degree." "The potato-blood," he says, "may be taken with good effect, a spoonful or two morning, noon, and night, in a glass of choice Canary, Malaga, or other good wines!"†

At different times considerable diversity of opinion has been expressed by agricultural writers respecting the comparative merits of potatoes and wheat, as articles of food and culture. The most violent enemy of the potato is Cobbett, who abuses it in no gentle terms. He styles it a degrading root, attributes to it the poverty and misery of the Irish, and at the same time denies its superior economy. He first tries to show that more actual nourishing matter is derived from an acre of wheat than one of potatoes. "Then," says he, "the expense of seed and planting is about equal; but the potatoes require cultivation during their growth, which the wheat does not; and a large cost for gathering, housing, and keeping, besides that of loss by frost: and they yield nothing in the place of straw, which, from the wheat crop, may be worth £4 or £5 an acre." "Then comes," says he, "the expense of cooking. Thirty-two bushels of wheat (the produce of an acre,) supposing a bushel to be baked at a time, would demand *thirty-two heatings of the oven*. Suppose a bushel of potatoes to be cooked every day, in order to supply the place of this bread, then we have (to prepare the produce of an acre) 900 boilings of the pot, unless *cold potatoes* be eaten at some of the meals, and in that case the diet must be *cheering* indeed! Think of the labor, think of the time, think of all the peelings, and washings, and messings attending these 900 *boilings of the pot*! For it must be a considerable time before the English people can be brought to eat potatoes in the Irish style; that is to say, scratch them out of the earth with their paws, toss them into a pot without washing, and when boiled, turn them out on a dirty board, and then sit round that board, peel the skin and dirt from one at a time, and eat the inside!" Again, after describing the process of baking, and exhorting to the practice at home, he says, "and pray what is pleasanter to behold? Talk indeed of your pantomimes and gaudy shows, your processions, and installations, and coronations! Give me for a beautiful sight, a neat and smart woman, heating her oven and setting her bread!" "And what is the result of her labor? Why, good wholesome food, sufficient for a considerable family for a week, prepared in three or four hours. To get this quantity of food, *fit to be eaten*, in the shape of potatoes, how many fires, what a washing, what a boiling, what a peeling, and what a slopping! The cottage everlastingly in a litter; the woman's hands everlastingly wet and dirty; the children grimed up to the eyes with dust, fixed on by the potato-starch, and ragged as colts; the poor mother's time all being devoted to the everlasting boilings of the pot!"‡

We Irish can readily observe that this picture is greatly overdrawn to answer the writer's purpose; he has, indeed, made use of the Irishman's own weapon, hyperbole, against him. We can likewise perceive, in spite of all that has been argued and asserted, that the potato is not the root

* Silliman's Journal.

* Salmon's Herbal.

† Cobbett's Cottage Economy.

of Ireland's misery; that must be looked for elsewhere. But that it has been one great cause of multiplying our population to a surprising extent, is very evident. Let us hear the remarks of a writer in one of our most distinguished periodicals. "Potatoes enter for a great deal into the present condition of Ireland. They are much cheaper than wheat, and it is so easy to rear a family on them, that there is no check to population from the difficulty of procuring food. The population, therefore, now goes on with a rapidity approaching almost to that of new countries, and in a much greater ratio than the improving agriculture and manufactures can find employment for it. All degrees of nations begin with living in pig-styes. The king or the priest first gets out of them, then the noble, then the pauper, in proportion as each class becomes more and more opulent; better tastes arise from better circumstances, and the luxury of one period is the wretchedness and poverty of another. English peasants, in the time of Henry VII. were lodged as badly as Irish peasants now are; but the population was limited by the difficulty of procuring a corn subsistence. The improvements of England were more rapid, the price of labor rose, and with it the comfort and luxury of the peasant, who is now decently lodged and clothed, and who would think himself in the last stage of wretchedness, if he had nothing but an iron pot in a mud house, and plenty of potatoes in it. The use of the potato was introduced into Ireland when the wretched accommodation of her peasantry bore some proportion to the state of the accommodation of that class all over Europe. But they have increased their population so fast, and, in conjunction with different causes retarding improvement, have kept the price of labor so low, that the Irish poor have never been able to emerge from their mud cabins, or acquire any taste for cleanliness or decency of appearance."*

Cobbett's assertion that wheat produces more nutritious matter per acre than potatoes, is now completely disproved. Later experiments have shown that it is very near the truth to estimate the proportion of the nutritive power of wheat to that of potatoes, as about seven to two; or, in other words, that two pounds of wheat afford as much sustenance as seven pounds of potatoes, though it may be doubtful whether it affords as much nourishment. Then, by calculating the produce of each of the two crops, it has been determined that one acre of wheat will produce sustenance for three persons, as long as an acre of potatoes affords it to six and five-sixths. This is upon the supposition that the power of nutrition of a plant is only in proportion to the quantity of farinaceous and glutinous matter contained in it. But this is by no means certain. We have not yet been able to discover what it is that renders one substance more proper for food than another. We have only approximated to the truth; for, although we can, by artificial means, condense the nourishing principle into small bounds, as in the case of essences, concentrated soups, &c.; yet we find that no animal can long continue to live on such substances undiluted. The stomach seems to require that the nutritious matter should be incorporated with, and enveloped, in a considerable quantity of some other substance, possessing no

nourishing power, in order that its functions may not be stimulated to excess. Sugar, oil, and butter are substances possessed of very high nourishing properties; a less quantity of them sufficing to sustain life than of most other matters: yet we find that if an animal (a dog, for example,) be fed entirely on any of them, he will not survive many days. Nature, stimulated by continual superabundant nourishment, is exhausted, and sinks under disease. In estimating, therefore, the amount of aliment afforded by potatoes and grain, we should rather calculate according to the mass of vegetable matter capable of satisfying a full grown person. This subject is exceedingly curious, and might be illustrated at great length. I cannot, however, pursue it farther at present. I may merely add, in connection with what has been remarked, that potatoes, from some peculiarity in the mixture or degree of condensation in their nutritive matter, seem to possess an advantage over all grains as constant food. It is well known that potatoes and water alone, with common salt, can nourish men completely; we have hundreds of instances, in many parts of Ireland, where the people have lived constantly on this diet, from necessity; and yet have been as robust, healthy, and long-lived as persons fed plentifully on animal food. Now, I know of no mealy substance used as the general food of a nation, without being mixed with other kinds of alimentary matter, such as oil, fruits, whey, or milk. MacCulloch, in his work on the Western Islands of Scotland, makes some remarks which bear on this subject. "I have hinted," says he, "at the deficiency of food among the Highlanders. The introduction of the potato has done so much to remove this once prevalent cause of misery and depopulation, that such a want is scarcely suspected. It is, however, still apparent. At present, it is true, the Highlander rears a fair proportion of children, the average number varying between three and four. The children are also universally strong, ruddy, and handsome, yielding nothing in that respect to their better clothed and better lodged neighbors of the low country, or of England. This air of health and good feeding continues till the age of labor, and for some space beyond it. But, at twenty, or shortly after, an evident change takes place. The skin shrivels, the bones of the face project, and the marks of age, already perceptible, increase rapidly to that period in which it becomes sensible in the laboring part of the community every where. After that there is perhaps no further comparative difference; and the limit of the Highland laborer's life stands on a fair average with that of the Lowlander or Englishman. This change is most sensible in women. Instances of beauty are by no means uncommon in the female children: but it vanishes at seventeen; and, shortly after, the marks of age hasten on so rapidly, that (with deference to the Highland fair be it said,) they acquire the aspect so dreaded by Queen Elizabeth, or the ancient fair one recorded in the well known epigram of Plato. This effect seems to proceed from the insufficiency of the food compared to the labor; and, to those who have seen the country, I need hardly say, that an equal, if not the greater share of that labor, is often the lot of the females. There is reason to suspect, from the greater durability of the lower classes of the Irish, where potatoes form the sole food, that this

* Edinburgh Review, vol. xxxiv. p. 380.

root is superior, in its nutritive qualities, to oats or barley; and we may therefore slight the misplaced compassion of those who lament the hard fate of the Highlander in the Islands, where a sufficient supply of oatmeal cannot be procured, and where the inhabitants depend on the potato."*

Let me remark, in conclusion, that the potato seems to have been the only plant wanting to complete the agriculture of the British Islands. Vast portions of land, in all the three countries, are by no means fitted for the cultivation of grain; yet there the potato will flourish. It will thrive where no other esculent vegetable will grow, and has this grand advantage, that, in such situations, it can be grown at very small expense. It has also this superiority over all kinds of grain, that it is perfectly secure against those heavy late rains which so often destroy the hopes of the farmer. The potato has rendered us entirely independent of foreign nations for a supply of food, and placed us almost beyond the reach of those frightful famines, which, in former times, so often devastated the land. It furnishes a proof that a single vegetable, when its importance comes to be properly appreciated, may work an entire change in the habits, the enjoyments, and the fortunes of a people.

From the [London] Examiner.

EXTINCTION OF FIRES.

The safety of the inhabitants being ascertained, the first objects at a fire should be the exclusion of all fresh air and the confinement of all burnt air—*suffocate* the flames—remember that burnt air is as great if not a greater enemy to combustion than even water; the one, till again mixed with oxygen, can never support flame; the other, especially if poured on heated metal, is converted into its elements, the one hydrogen, in itself most highly inflammable, the other oxygen, the food of fire. For both purposes, of excluding the one air and confining the other, all openings should be kept as carefully closed as possible—the prevailing practice of breaking the windows is peculiarly mischievous. The only excuse for this is the admission of water; but if the firemen were provided with proper self-supporting ladders (Gregory's, or any other, that need not lean against the walls,) they might direct their branches through a single broken pane with ten times more accuracy than by their random squirting from the street. Water should be made to beat out the fire by its impetus; aspersion is but useless. An attempt should always be made to stop up the chimney-pots; wet rags, blankets, or an old carpet, will serve this purpose, and thereby confine a considerable quantity of burnt air. The same materials, well wetted, should be freely used in covering the nearest roofs and windows; and, in order that water may be freely conveyed to the very tops of the neighboring houses, and for many other purposes, outriggers with ropes and pulleys should accompany the engine.

From the Monthly Magazine.

GAS.

The mode of adapting it to lighting our streets and houses, was discovered by a Frenchman, an

* Western Isles.

engineer, named Lebon, about twenty-five years ago, who gives the following particulars of the circumstances which first led to its application. It was about 1663, that Becher, a skilful chemist, discovered that coal, when calcined in close vessels, yielded a kind of oil resembling tar, and capable of serving for the same uses. Experiments made in 1758, in Alsace, for the extraction of this oil, proved that the calcined coal left in the retort was of excellent quality for melting iron, and for all domestic purposes. In 1786, M. de Limbourg, having employed the same processes at the forges of Theuse, in the principality of Liege, substituted for earthen retorts, which till then had been made use of, retorts of cast iron, which are more durable, and in which an opening may be made, provided with a door for putting in and taking out the coal. These experiments were repeated with success in England and France. In the prosecution of them it was found that besides the solid and liquid products, there was disengaged an inflammable gas, composed of carbon and hydrogen, and which was therefore denominated *carburated hydrogen*. In 1799, Lebon conceived an idea of adapting this carburated hydrogen gas to a useful purpose, and realised it the same year at Paris, by exhibiting the interior of his house and garden illuminated with it, issuing from a large reservoir, where it underwent a slight compressure, and was conducted to the lamps by small tubes furnished with cocks, that could be opened at pleasure to light the gas, or closed to extinguish it. Lebon set up one of these apparatus, which he called thermo lamps, at the Theatre de Loerovis, where every body had an opportunity of seeing it for several months. It was the very same apparatus now employed in England, but on a much larger scale. The only difference is, that Lebon obtained his gas by the calcination of wood, and the English from coal.

From the Horticultural Register.

ON ACCELERATING AND RETARDING THE MATURITY OF FRUITS AND VEGETABLES IN THE OPEN AIR.

Every gardener who supplies markets is aware that fruit and vegetables exposed for sale early in the season generally obtain higher prices than those brought when the bulk of the crop comes forward. Private gentlemen keeping gardeners are also equally alive to the luxury of having their tables spread with fruit and vegetables at least as early as they appear at market. It seems therefore a point of some importance to gardeners to seize every advantage which situation, the nature of the soil, or the experience of others offers to effect this purpose; and while I lay before the readers of the Register the result of my own experiments and observations, I earnestly solicit from others, communications on a subject which opens a field of so much interest both to the intelligent observer of the laws of vegetable life, and to the practical horticulturist.

In one of the numbers of Loudon's Gardener's Magazine, I observed a method of obtaining early strawberries by planting them in intervals between bricks laid like a bank slanting towards the south;—pursuing this idea I raised a bank of rich earth about three feet high, running east and west, that

is, one side south, the other north; this I faced with the irregular masses of pudding stone which abound in this vicinity, leaving spaces in which I planted strawberries. My reasoning was, that the stones, by preventing evaporation, would keep the soil moist in which the roots grew, a state very favorable to the swelling and size of the fruit; that the heat of the sun imbibed by the masses of stone on the south side where the fruit lay, would ripen it earlier; particularly, being dry, they would not so soon cool as the earth, the evaporation from which produces considerable cold on the surface; that the berries reposing on the stone would be kept free from dirt during heavy showers; and lastly, that while the south side was earlier, the north would be somewhat retarded; and thus prolong the period of enjoying this wholesome fruit.

My expectations were however, only partly fulfilled. I had a good crop, very clean, some late, but not more than a dozen or two were in advance of my neighbors. On these results, I observe, that my bank although three feet high had no additional shelter by pailings or fence behind it, against the cold north winds, which prevailed far in the summer of 1834, and which certainly penetrated the north side, keeping the temperature of the earth round the roots of the south plants so low as to check advanced vegetation. Again, gardeners employed in forcing are aware that those plants alone are fit for their purpose which have gone earlier the preceding autumn into a state of rest; consequently, it is probable that with proper shelter, such a plantation would be some days earlier the second year than the first, the plants having gone sooner into the above state. I will mention that by the assistance of a few hand glasses and Russian mats, I have seen a south bank of strawberries, well protected by a wall, in fruit eight days earlier than the common crops.

The fruit of the strawberry plant may also be postponed by pinching off the flower buds, as soon as they can be discovered, but carefully, so as not to injure the leaves or the heart of the plant, until the second or third week in June, when they must be left to fruit, always destroying the shooting runners, and observing that in hot weather they must be plentifully supplied with water or the blossoms will shrivel and be sterile; this is an easy task if the plan of a bank such as I have described is put in practice, because the ridge at the top can be made with a channel capable of being quickly filled with water, which will then gradually soak through the whole, without being rapidly evaporated at the surface.

With the deepest respect for Mr. Knight and other writers on the subject, for well their labors entitle them to this feeling from every cultivator—I am yet inclined to think that their expression of a state of rest for nature will prove something like that of the chemists of old, that "nature abhors a vacuum," and the industrious researches now in progress respecting the structure and uses of the various parts of plants will probably prove that nature does not require rest, but is, during this state of *hybernation* or wintering, in silent and invisible, but active preparation for the spring and summer campaign, when she will inundate the earth with her innumerable hosts of delicious fruits and flowers captivating and leading into sweet bondage all the dwellers thereon who come within reach of

the beauty or incense of the latter, or the cool refreshing juices of the former. Similes are, however, little suitable to the tiller of the soil; he will find enough to puzzle him in the general classes of botany without meddling with the metaphoric class of flowers of composition.

The growers of seeds of culinary vegetables, might easily experiment on a small scale whether the seeds of plants forced one year would naturally vegetate earlier than those not forced, both being afterwards sown under exactly similar circumstances, observing that if it only made a difference of three or four days the first year, it might by forcing and management increase progressively the second year, and so on until by degrees this difference would at last become sensible. The same may be done with potato sets and many other plants.

If the first crop of peas were sown at the foot of a deep ridge formed by the plough facing the south, it appears to me that the young and tender shoots just rising from the earth, would receive considerable protection against the early north winds, as I have often found plants growing on the south side of a stone shoot and blossom earlier than the same plant on the other side; any one may observe in a piece of ground ridged by the plough or otherwise that the white frost appears on the upper edge and perhaps half way down, while the bottom of the trench has not been touched. This is perfectly in accordance with known principles in meteorology. I have tried the above method with complete success, but not in this vicinity. Every person conversant with peach trees, must know that there is a difference of a full fortnight in ripening fruit on the same tree, owing no doubt to aspect, original earlier vegetation of some blooms, shelter from or exposure to the sun; all these and many other circumstances may furnish ideas for experiment to the acute observer, and intelligent cultivator. It is not improbable that if the bloom buds, which are late, were rubbed off, previous to opening, those in a more advanced state, might be strengthened and forwarded. There remains indeed on this subject much scope for the application of ingenuity and industry, which I should be extremely glad to see in active operation. To delay the maturing of gooseberries and currants and to preserve the fruit in its natural state until September or October, I should recommend the selection of those trees most abundantly provided with berries; as soon as these have attained their full size and are just beginning to ripen, lay a clean Russian mat over the tree, gather it together round the stem about an inch from the ground and tie it firmly up with a string; the object being to shade it almost entirely from the rays of the sun, it would perhaps be as well for the first month or six weeks to put on a double mat, removing the upper one time enough for the autumnal sun to penetrate that underneath. I have eaten fine gooseberries preserved in this way only with a single mat as late as December in England, but that year no frost of consequence had then taken place; here I fear we cannot promise ourselves exemption so late, and frost would infallibly injure the flavor.

I have said little in this communication respecting hand glasses, or what are cheaper and nearly as good for mere protection during cold nights, frames covered with oiled white paper; these are easily made by sawing sugar boxes in halves hor-

izontally and fastening the paper in place of the top or bottom; they should be sunk an inch deep in the surface of the earth, and the crevices well stopped with putty. I trust that future communications will enable me to add information of a much more valuable nature on this interesting subject, than is offered to the public in the present paper, my principal object being to give an impulse to inquiries and experiment.

J. E. T.

From the Wilmington Democrat.

DIFFERENCE OF WEIGHT AND VALUE IN PORK AND BACON.

We are disposed to think that practical knowledge on this subject would be highly acceptable to every intelligent farmer, especially when such knowledge is derived from a source entitled to implicit confidence. Dr. Wilson, of this county, from whom we obtained the subject matter of this article, assured us that he last season personally attended the weighing, salting, &c. of the hogs referred to below; and we have no doubt that similar experiments by other farmers will produce like results.

The following is the weight of four tolerably fat hogs about eighteen months old, after they were killed and well cleaned—

The 1st hog weighed	135 pounds.
2nd	140
3rd	142
4th	154

Total weight, 571 pounds.

Hams of the four hogs weighed	128 pounds.
Shoulders,	147
Middlings,	148
	423 pounds.

Heads, feet, back bones, and leaf fat, 148 pounds.

The hams, shoulders, and middlings were salted, and in four weeks and three or four days, again weighed:

Hams,	125 pounds.
Shoulders,	143
Middlings,	143
	411 pounds.—Loss 12 lbs.

They were next well washed, hung up, and smoked two months and two weeks, and again weighed, after removing the adhering ashes.

Hams,	110 pounds.
Shoulders,	126
Middlings,	126
	362 lbs.—Additional loss 49 lbs.

So the 571 pounds of pork gave 362 pounds of bacon. Is it more profitable then to sell pork or make bacon of it? Suppose, for example, the Doctor had sold his pork at five dollars per hundred pounds.

571 lbs. at \$5 per 100 lbs.—\$28.55.

And suppose a speculator had bought, cured, and sold it, say only at 10 cents per pound.

This shows a difference in favor of making bacon, amounting to \$7 65 from 571 lbs. of pork. Perhaps you'll say, "there's the expense of salting, smoking, interest, &c. which you would not have taken into the account." What! have you already forgot that we also omitted to say any thing about the heads, feet, back bones, and leaf fat, which weighed 148 pounds? And were not these amply sufficient to defray all the expenses attending the curing of the bacon? Another may hint that the publishing of such experiments will bring the consumers about our ears. Don't let them be alarmed—there's no occasion. Rather let them consult the matter and determine whether it would not always be to their advantage to purchase a supply of pork at Christmas to furnish a sufficiency of bacon throughout the ensuing year. Our farmers are generally too much prejudiced against what is called book farming, to profit by newspaper publications. We frequently quote weightier matters under agricultural heads, but they are usually passed over in such a manner that we are under no apprehensions that this article will induce any farmer to believe and act as though *selling his pork were not saving his bacon*.

From the Farmer and Gardener.

TO PRESERVE PEACH TREES FROM WORMS.

I have been a constant reader of the American Farmer from the time of its first publication, and frequently referred to it, in hopes of finding an effectual remedy against the attack of the worm on peach trees. I found at different times a number of publications upon the subject, and believe have tried the greater part of the remedies therein prescribed, without success. Finally, I concluded that the old method of cutting the worm out with a penknife, was the only one upon which any reliance could be placed, and have therefore been in the constant habit of preserving my trees in that way for years. I have, however, lately made an experiment, which I have every reason to believe, is quite as effectual, and attended with much less trouble. About a year ago, after I had gone the rounds, laid bare the roots, and cleared my trees of the worm, I took some fine screenings of Anthracite coal, and put about a quart or two to the roots of each tree; this was done to about the one half of my peach trees. Last fall I went round as usual to cut out the worms; those trees which had the Anthracite coal screenings about their roots, were without a single exception, clear of worms, the others had, as usual, a considerable number. I immediately applied the coal to the whole of my trees; and thus far, am well pleased with my prospects of success. I propose continuing the experiment another year, after which, I can speak with more certainty upon the subject; but the circumstance that half of the trees upon which the experiment was made, although situated precisely like the others, having been found clear of worms, when the others were full of them, is strong evidence in my mind that the remedy will prove effectual.

N.

Orwigsburg, 25th Jan. 1835.

From Loudon's Encyclopedia.

HAY MAKING—MANURE.

The art of making hay does not seem to be understood in the north of Lancashire or in Dumfriesshire any more now than it was in most parts of Scotland twenty-six years ago. The hay is put into cocks, which are left in the field till the outside by alternate rain or dew, and sunshine, is burned to a dusty woody matter, and the interior is rendered too dry to undergo the proper degree of fermentation when put in the rick. Indeed in Scotland the fermentation of hay in the rick did not use to be considered necessary, any more than the fermentation of the liquid food of pigs before giving it to them, or of liquid manure before applying it to the soil. Yet, though the Middlesex very superior mode of making hay does not appear to be yet prevalent in the north, we observed the bad Middlesex practice of dunging the meadows and grass lands with rotten stable dung, and composts of dung and lime, adopted in the park at Lowther Castle, and at several places near Lancaster. Mr. Ogilvie, an extensive Scotch farmer at Mere, near Knutsford, manures his grass land only with liquid manure, fermented in tanks in the Dutch manner, before being carted out; and this we consider to be by far the best, because by far the most economical, mode of manuring grass lands. The practice of forming compost heaps, by mixing quicklime with putrescent manure, or even with soil containing much vegetable matter, is contrary to all science, as was long ago shown by Lord Meadowbank. The lime is rendered much less fit for acting on the soil of the field, than when it was newly taken from the kiln; and the carbon of the dung, or organized matter in the heap, is rendered insoluble in water, and consequently unfit for being taken up by the roots of plants.

GEOLOGICAL SURVEY OF VIRGINIA.

Report from the Select Committee, to whom was referred certain Memorials from Morgan, Frederick and Shenandoah Counties, praying for a Geological Survey of the State, with a view to the discovery and development of its geological and mineral resources.

The select committee, to whom was referred sundry petitions from the counties of Morgan, Frederick and Shenandoah, on the subject of a geological and chemical survey of the state, have had that subject under consideration, and respectfully report:

1. In looking to the example of other countries, as well as of several of our sister states, it would appear that great practical importance is attached to the geological and chemical inquiries which they have respectively instituted. In conjunction with extensive and minute topographical surveys, many of the governments of Europe have set on foot systematic and detailed inquiries into the geological features and mineral resources of their respective domains. France, Sweden, Russia, several of the German and Italian states, and Great Britain, have shown great activity in pushing forward these investigations. The latter government especially, has distinguished herself by the most liberal and steady zeal in developing those natural resources of the land, which form

the basis of her wealth and power. The ordnance map of Great Britain, which is yet only in part published, and which, besides topographical, contains also *geological*, details, is looked upon as a signal proof of the liberal spirit and practical wisdom of the government of that country. In this country likewise, a growing conviction of the great importance of such inquiries, has led several of the states to make provision for extensive practical surveys, on a plan somewhat analogous to those conducted in Europe. The survey of Massachusetts, under the superintendence of Professor Hitchcock of Amherst college, has already been completed, and judging from the immense mass of details, under the head of economical geology, embodied in his comprehensive report recently published in a very large octavo volume, there can be no doubt that the community for whose benefit the survey was undertaken, has been amply gratified by the important discoveries it has brought to light, and the valuable practical bearings of most of its details. In this report, we behold a state possessing but little variety of geological features, displaying an amount and diversity of resources, (in part until now undiscovered, and never before arranged so as to be understood,) which cannot be contemplated without pride and satisfaction. Maryland and Tennessee are following the wise example of Massachusetts, and there is reason to believe that New Jersey, Pennsylvania and New York will, either during the present or the next year, authorize similar undertakings. In the preliminary report of Professor Ducatel of Maryland, will be found the most abundant evidence of the practical benefits which are to be anticipated from such researches. Though based upon a merely superficial reconnaissance of the state, this valuable document develops a number of interesting facts in its geology, of which little or nothing had been previously known, and from which new impulses to the enterprise of extensive districts of the state, may be confidently expected to proceed. The subsequent report recently presented to the legislature of Maryland, embodying all the details of the first year's operations in regular survey, has not yet reached us, but from what we learn, the developments which it contains are of a character to enlist the wisdom and patriotism of the state very warmly in the prosecution of the survey. Of the practical utility of the researches now in progress in Tennessee, the published reports and other documents relating to the subject, speak in the most unqualified and encouraging language. The labors of Professor Troost, to whom this survey has been committed, have already contributed a large amount of useful information relative to the mineral and agricultural resources of the soil of Tennessee. In the other states above alluded to, the adoption of similar measures for the investigation of their natural territorial resources, has been delayed from year to year by considerations of *economy*, to which the heavy debts accumulating in the prosecution of public improvements, have constrained them to defer. But no doubt appears to have existed of the real utility and highly important practical bearings of judiciously conducted geological and chemical surveys. Indeed, notwithstanding the heavy incumbrances under which some of those states are now laboring, projects of such surveys are at this time under

discussion in their legislatures; and there seems to be no doubt, that either now or at some early day, the necessary provisions will be made for commencing the investigations desired.

2. Witnessing the valuable results of these researches in Europe, and in some parts of the United States, we should of course anticipate similar benefits from inquiries of this nature conducted within our own territory. Nor would it be necessary, in order to feel convinced of the utility of such a survey as applied to Virginia, to refer in detail to those particulars in the physical character of the state, upon which it would bear with the most direct and prominent advantage. All are willing to admit the great extent and value and diversity of our mineral wealth, and at the same time to confess that its distribution through our territory, its precise boundaries in any one locality, its exact nature as ascertained by science, and its susceptibility of economical and profitable application to the purposes of commerce, manufactures, and the arts of life, are matters of which scarcely any thing as yet has been accurately determined. The mere surmises of ignorance on the imperfect observations of the inexperienced explorers, who have examined without any adequate lights to direct their investigations, appear to have furnished nearly all the knowledge upon these points, of which we have as yet become possessed. To feel thus assured of the existence of a great variety of mineral riches within our territory, and at the same time, except in a few instances, to have availed ourselves of but little of the benefits it professes, and to know but little of its position, nature or extent, are certainly in themselves powerful reasons for the adoption of some scheme of systematic, minute and extensive research. But, however obviously the advantages of such surveys might be inferred from these considerations, in connexion with the acknowledged benefits which other states have derived and are deriving from them, your committee have felt it incumbent to inquire more particularly into the specific bearing which inquiries of this nature would have upon all the great divisions of our territory. In attending to this point, a number of interesting particulars have come to their knowledge, some of which are perhaps not generally known, and all of which still further confirm them in the belief, that such a survey as the one in question, cannot fail to prove eminently advantageous to our state. Most of the facts here referred to, have been discovered by mere accident, and by persons seemingly unconscious of their importance; consequently, little or no improvement of them has been made, and no researches undertaken to ascertain their real extent or value. In adverting to the beneficial application of such a survey to the several great divisions of our territory, your committee feel at liberty to touch only on some of the more prominent particulars in which its utility would be felt: and, indeed, it is only in the actual progress, or at the completion of the investigation, that the most important of its practical bearings can be appreciated and understood. Discoveries of great general interest and of invaluable local importance, would, there is reason to believe, reward even the earlier efforts of those connected with the enterprise; and districts of the state, at present almost deserted from supposed meagreness of resources, would behold spread out be-

neath their soil, the rich earths, which were soon to diffuse fertility over their hills and plains, or the valuable rocks and ores from which enterprise was to derive new incentives to exertion.

3. Commencing with the tide-water portion of the state, your committee would remark, that the vast marine deposit of shells and other calcareous matters which underlie a great part of this region, may be considered practically, as well as in a scientific aspect, as one of the most important features in the geology of the state. The exhausted soils of many of the eastern counties, are already exhibiting the most astonishing proofs of the fertility which this calcareous matter is capable of bestowing, and it may be confidently expected, that when a more extensive and systematic attention to the employment of this manure shall have been adopted throughout eastern Virginia, a degree of agricultural wealth and prosperity will be realized, of which a few years since, or even at this time, it would be difficult to conceive. To the rapid, general and successful extension of this ameliorating system, there can be no doubt that a geological and chemical examination, extended to all the eastern counties, would be in a high degree conducive: in most of them marl has already been discovered: cliffs of it appear on all our rivers, and sometimes for miles, an uninterrupted bed of this precious manure forms one or both of the confines of the stream. But of the composition of its numerous varieties, of the districts which they severally occupy, and of the value of the various earths with which they are associated, but little general or systematic knowledge has been acquired. To one individual, the able editor of the Farmers' Register, the state is indebted for nearly all that has been done on the subject. But how important would it be to investigate the extent and character of this deposit more minutely; to trace it upwards from its first appearance near the mouths of our rivers; then, by transverse lines, to explore all the counties in its range, and at each step of the investigation to ascertain its agricultural value by chemical analysis.

Within the tide-water district also, but in a region to which the common marl does not generally extend, another deposit of even higher fertilizing properties than the former has recently been discovered. This substance, called green sand, from its consisting of granular particles of a green aspect when dry, is geologically an *older deposit* than that which embodies the ordinary shell marl. In the beds of the latter, however, in many situations, a very large per centage of the green sand has been discovered, and the value of the marl is believed to be much increased by the presence of this ingredient. The extent of this immense green sand deposit is yet conjectural, but that it reaches, with perhaps no interruption, from the Potomac to the Roanoke, may be confidently asserted. It shows itself on our rivers at a distance varying from a few miles to 20 or 30 from the head of tide, and it may be interesting to remark that the geologist of Maryland, guided by the experience of those who ascertained its existence in Virginia, has recently discovered a continuation of the deposit throughout the neighboring state. Of its relative value in the different localities, nothing is yet known; respecting the depth and breadth of the deposit, scarcely any thing has been ascertained. Here then would be an impor-

tant field of geological and chemical inquiry, and one in which the agriculture of lower Virginia could not fail to be deeply interested.

Associated with this deposit, and generally forming the superior stratum, is an extensive formation of selenite or gypsum. Whether this be an invariable attendant of the green sand, is of course undetermined, since of that deposit so little is yet known—but so far as observation has yet extended, it would seem to be a general associate of the green sand, specimens from the Potomac, Rappahannock, Pamunkey, and James Rivers, agreeing in containing some portions of gypsum.

In this region too, a variety of clays suitable to different species of pottery, are known to exist, an examination of which would doubtless lead to the introduction or extension of an important branch of industry. *Alum earth* and *copperas earth*, of which immense quantities are found in Maryland, and applied to the manufacture of alum and green vitriol, exist also in this part of our state, and probably in great abundance. Bog iron ore, one of the most valuable of all the ores of that metal, would also be met with extensively. Bordering on this region, at its upper limit, a variety of valuable products might be expected. In the south especially, the *secondary* rocks immediately adjacent to the *granite* ledge, would be deserving of particular attention. In this vicinity might be anticipated a third deposit of fertilizing marl, identical in position with the gunpowder marl of New Jersey. A stratum of magnesia earth has, within a few years, been discovered at one point along this line—and it is not improbable that its value, either in agriculture or in the manufacture of epsom salts, may lead hereafter to its profitable employment. Chemical examination would determine the value of these various matters, and new incentives might thus be given to the manufacturing enterprise of this portion of the state. The several varieties of water furnished by springs and wells would also form a subject interesting to health, and in other respects practically useful.

4. The space extending from the granite ledge to the Blue Ridge, embracing all the varieties of primary rock, containing the yet imperfectly traced gold region, the bituminous coal fields, and a vast variety of other mineral wealth, is next to be considered. Here, to trace out the gold region entirely through the state, would be an important and useful work. From what is already known of this deposit, there is every reason to augur its great extent and value. Indications of this metal have been found even in Goochland, and at other points far removed from the supposed line of the formation. A systematic inquiry on the subject would evidently result in much practical advantage, not only by opening up new discoveries, but by preventing those ruinous expenditures which are occasionally incurred for want of the proper guides to inquiry and research. The coal fields of Goochland, Chesterfield and Powhatan, from which eastern Virginia has already reaped so many benefits, would present a most interesting subject of geological examination. To ascertain the dips and convolutions of the various strata overlying and subjacent to the coal, and to investigate more attentively than has yet been done, the line of out crop connected with the coal, might

lead to discoveries of no small importance to the prosperity of the state. That the real extent of those coal beds is not yet accurately known, is evident from the discovery of indications of this mineral in situations at some distance from any of the workings; for instance, on the line of the contemplated Richmond and Fredericksburg Rail Road.

In Prince Edward too, bituminous coal is found, and there is reason to believe that the seam from which the specimens have been derived, forms part of a very extensive basin of this mineral. Nor is it improbable that between the Richmond and Prince Edward deposits, and in the same geological range towards the north, this valuable mineral might be brought to light. Among the granite and feldspar of the region we are now considering, valuable deposits of porcelain clay are already indicated. A stratum of this substance is known to exist in the vicinity of Charlottesville, and specimens have recently been obtained from a bed in Goochland, which in appearance, give promise of considerable value. That this earth will be found in many places throughout the region referred to, there can be no doubt. The rock feldspar, from which it is produced by the slow action of the elements, is an important constituent of our granite, and exists in some places in a separate mass. It is with this rock that the earth is mingled in certain proportions in the fabrication of porcelain; and the very beautiful material of this nature, now so successfully manufactured in Philadelphia, is formed of the clay and feldspar procured in the vicinity of that city and Wilmington, localities in the same geological range with the region in our state to which we now refer.

In this region too, will be found valuable beds of iron ore of various kinds, some of which are already known and wrought. Serpentine and magnesian rocks also occur, in connexion with which the valuable ore from which chrome yellow is manufactured, may be expected to exist. In the vicinity of the South-west and Buffalo Mountains, on both sides, a variety of important minerals are embedded. The shale of this ridge in Amherst and other places, yields, by the action of the atmosphere, great quantities of green vitriol, which impregnating the water as it filters through the rock, gives rise to some of the most powerful chalybeate springs in the United States. To the east of this ridge a belt of blue limestone appears, which would seem to be a continuation of the Potomac marble. From the continuity of this narrow vein through Maryland, high up into Pennsylvania, it would appear to constitute a very important feature in the geology of this district. It crosses the Potomac, and rises in one or two places before it appears very distinctly at Everettsville, and then shows itself very abundantly in Amherst, where it is associated with marble of superior quality. On the eastern side of this belt, is a large vein of flint, which experience shows to be equal to the common gun flint. Copper occurs very abundantly on the west side of the Buffalo ridge, and would probably be found interruptedly in the same range throughout the state. In the continuation of this line, it is found abundantly in Maryland, associated with iron and manganese. These metals would appear to be associated with it in Amherst. The vein of copper in this county

was largely worked prior to the revolution, and the impression prevails that a valuable percentage of gold is contained in the ore. Such is the fact in regard to a copper ore which is now wrought in New Jersey, and analysis might be usefully directed to this point with reference to the Virginia ore. The particulars here stated are only a few of what might be gleaned from the personal observations of intelligent farmers or scientific tourists, who have paid attention to the geology of this region, but they are abundantly sufficient, in the mind of your committee, to evince the advantages which this section of the state would derive from systematic geological and chemical inquiry.

5. The valley of Virginia would offer a multitude of valuable discoveries, and among them extensive beds of coal would certainly be numbered. The anthracite recently discovered in the counties of Berkeley, Augusta and Morgan, and the extensive mines of bituminous coal of Hampshire, indicate what may be anticipated from minute and judicious research. If we look to the inexhaustible deposits of this precious mineral, which the enterprise of Pennsylvania has brought to light, and with which, perhaps, more than any other of her vast mineral resources, she is now building up the permanent fabric of her wealth and power, with what satisfaction should we welcome a discovery which properly improved, may lead to an equally enviable condition of prosperity in one of the loveliest and richest sections of our state. In this region, the noble ranges of the North and Warm Spring Mountains, with their numerous subsidiaries, would furnish an almost unexplored field to the geologist. Valuable metallic ores, in addition to those already discovered, and new medicinal springs, would here reward his labors. The sandstones, limestones, slates and marbles, yet reposing unbroken in the hills, would all be subjects of interesting observation. He would examine also the rich saline deposits of the caves, and gypsum with which it is sometimes abundantly associated. The beautiful and copious fountains in the Warm Spring Valley, including the Warm, Hot, Sweet, Alum, and other springs, would claim his scientific scrutiny. The other waters, such as those of Bath in Morgan county, and Augusta, would also be examined. These and a variety of other objects to which geological and chemical inquiry might be profitably directed in this region, have an importance which must give peculiar interest to the prosecution of such researches in the great valley of Virginia.

6. Beyond the Alleghany we behold a region of almost unparalleled natural riches. Here we have the vast bituminous coal formation of the west, as extensively displayed as in Pennsylvania; and in addition, salines and a gypseous formation with which even New York cannot compete. The immense strata of this region, sweeping with a gentle inclination from the mountains, extend far west, until they reach the Mississippi in nearly horizontal planes. The ocean that once rested on this vast tract, besides the legible impressions of his former sway, visible in almost every rock, has left deep in the earth, and in some places extending to its surface, the rice treasures of salt with which his waves were once freighted. In some places, as at Abingdon, this saline matter would appear to exist beneath in massive form. Amid the spurs of the Alleghanies are abundant evi-

dences of coal: metallic ores, among which may be enumerated lead and iron, are also found in this western region. Here, too, are poured out many of those healing waters to which crowds of invalids now annually resort. In a word, this portion of the state teems with matters of interesting inquiry. Yet it is only at a few points that its treasures have been opened up, and but little certain is yet known of their relative arrangement, of their extent, or their comparative value. This vast territory is destined by its mineral riches alone to become at some future day, one of the most prosperous and wealthy districts of the state, and no part of Virginia is more deeply interested in procuring a geological survey.

7. Besides the numerous points of inquiry alluded to in the above brief review of our territory, there is one investigation which would be applicable to all sections of the state, and which would undoubtedly contribute to the general benefit of our agriculture. We refer to a systematic analysis of all the important varieties of soil within the state. This would be a work of great labor, but would unquestionably repay the state one thousand fold.

8. Keeping permanently in view the peculiar practical bearings by which such a survey should be directed, a proper attention should also be paid to those general and scientific relations, which the progress of the investigation would disclose. In many instances, the generalizations of science would be found of great utility in guiding observation; and the determination of many interesting questions of a purely scientific nature, would be incidental to the practical researches of the geological and chemical inquirer. The relative ages of all the great formations of the state, might eventually be made out; the periods at which disturbing causes, at many points, broke up and contorted the stratification, and the relations of the various agencies which have formerly been in operation in our territory to those now in action, both as to quantity and kind, would all be elucidated in the progress of the survey. The geologists of Europe, are so well aware of the interest that attaches to this portion of the United States, on account of the diversity and extent of its formations, that they are, at this moment, looking with impatient anxiety for some systematic effort to unfold its true physical character, and to bring fully to light the treasures that lie hidden beneath its surface.

In the execution of the proposed geological and chemical survey, your committee would observe, in conclusion, that the most advisable plan would seem to be, to divide it into two parts: namely, 1st. A geological reconnoissance of the state, with a view to the general geological features of our territory, and to the chemical composition of its soils, minerals and mineral waters; and, 2d. A detailed geological survey of the various sections of the state. The first part of the plan would possess of itself a separate and independent value, would be attended with but little expense, and would furnish to a succeeding legislature, the most satisfactory means of estimating the value of a detailed survey, and of deciding or pausing at the point to which we should then have attained, or of proceeding directly to the execution of the entire scheme.

In conformity to these views, and with the object of advancing directly to the accomplishment

of the first part of the plan, your committee beg leave, respectfully, to report the accompanying bill.

AN ACT TO AUTHORIZE A GEOLOGICAL RECONNOISSANCE OF THE STATE, WITH A VIEW TO THE CHEMICAL COMPOSITION OF ITS SOILS, MINERALS, AND MINERAL WATERS.

[As amended from the bill reported by the committee, and passed by the General Assembly of Virginia.]

Be it enacted by the General Assembly, That as soon after the passage of this act as it may be convenient, it shall be the duty of the board of public works to appoint a suitable person to make a geological reconnoissance of the state, with a view to the general geological features of our territory, and to the chemical composition of its soils, minerals and mineral waters, and to report to the next General Assembly a plan for the prosecution of a geological survey of the state, together with such facts as may have come to his knowledge during the progress of said reconnoissance, illustrative of any advantages likely to accrue from a more complete examination.

Be it further enacted, That the said board of public works shall have authority to allow to the geologist who may be employed under the provisions of this act, such compensation as they may deem reasonable to be paid out of any unexpended moneys in the treasury: *Provided,* that such compensation shall not exceed the sum of fifteen hundred dollars.

This act shall commence and be in force from the passing thereof.

From the New York Farmer.

AMERICAN FILBERTS.

We have laying before us some as fine filberts as we ever saw, raised at Lansingburgh, in this state, by Mr. Walsh. Mr. W. says, the season was not favorable, and that these are smaller in size than some he raised before; but, they are nevertheless excellent in quality, and, even as to size, larger than the average of the imported nuts.

The above is copied from the New-York American. Large quantities of these nuts are imported. Mr. W. is fully of the opinion that our climate will ensure their fruitful growth. He has cultivated them for several years.

From the New England Cultivator.

CLOVER.

Clover will grow on pretty much all soils that have been laid dry by good drains. It is the basis of good farming, on all lands susceptible of alternate husbandry. Its benefits are three-fold: it breaks, pulverizes and ameliorates the soil by its tap roots, and it furnishes a cheap food for plants as well as animals. A good clover lay is worth to a crop, by the food which it affords, as much as five tons of manure to the acre. To ensure a good lay, at least ten pounds of seed should be sown to the acre, and the ground well rolled. Its value, as food for plants, depends more upon the quantity of roots than upon the luxuriance of the stems, though the abundance of the latter will depend in

a great measure upon the number of the former. To obtain the full value of this plant, we must cultivate it as a food for our crops, as well as our cattle; and in this case we should use it as such the first or second year, before it has run out. There is economy in always sowing clover with small grains, though it is to be ploughed in the same or the next season. Ten pounds of seed costs upon an average one dollar—the labor of sowing is comparatively nothing. Its value to the next crop cannot be less than quadruple that sum, to say nothing of the feed it may afford, or its mechanical amelioration of the soil.

STONE FENCES—ASHES AND GYPSUM—LIME.

To the Editor of the Farmers' Register.

Frederick County, Feb. 23, 1835.

At the request of a Querist in the last No. of your Register, I take the liberty of sending you for publication, the following remarks.

Round stones being indifferent materials for making stone fences, they should be worked with care and attention in building the fence—they should be disposed of in the fence as cannon shot are usually stacked up, so as to be made to press as much as possible to the centre. The base and sides of the fence should form nearly an equilateral triangle, so that a transverse section of it would represent such a triangle. The length of the base line will of course depend on the height of the fence, which should not be too great, otherwise it may slip down; nor would any height prevent some kinds of stock from running over its inclined sides. This kind of stone fence is best adapted to underpin stab, post and rail, or plank fences—to which it is admirably suited—and may be of any height that such fences may require, giving it always the angle above mentioned. It is not necessary to dig a foundation in the earth for it, which may prove injurious, by forming a receptacle for the water, which would otherwise run off, instead of settling in the fence, and sapping its foundation.

A mixture of drawn ashes with plaster when sown, renders the operation less distressing to the laborers, whose eyes are apt to be incommoded by the flying of it. It also enables them to strew it more equally, regardless of the wind, which often interrupts the operation, when sown alone. The quantity used will depend mostly on the quantity at command; for persons having more than will afford an equal portion for the plaster, it is usual to mix half and half, and to sow about a bushel of the compound to the acre, or more, as the farmer may choose, depending on the situation of his land, whether it has been plastered before, or not, &c. With the plaster and ashes may also be mixed clover, or other grass seeds, in any proportion desired, when the whole operation can be performed at the same time.

The beneficial effect of lime as a manure is so generally admitted, that, to deny its operation in any instance, is hazarding the charge of skepticism; nevertheless, there are cases in which the zealous farmer is sadly disappointed in the result. Whether it be owing to the soil in a limestone region of country, being already saturated with lime, so as to effervesce strongly with acids, or to some deleterious quality of it, as magnesia, &c., the re-

sult is often different from the generally received opinion. Lime should therefore be used experimentally: at first in small quantities, to see what effect it has, and increased afterwards as the result indicates it should be. It is unnecessary as an adjunct to putrescent manures, in the first instance, whose softer parts will easily decompose without it; but should it not be used as an alternate manuring, to succeeding crops, to dissolve the coarse parts of vegetables, which will not easily dissolve of themselves?

GENERAL ACCOUNT OF THE VINE, AND ITS CULTURE IN THE ENVIRONS OF PARIS.

Translated for the Farmers' Register, from the *Annales de l'Agriculture Française*, for October 1831.

[The following translation of a very recent account of vine culture and management, is offered under the belief that most of the vine cultivators in this country will be pleased to know what is the most approved practice at this time in a region very unlike their own, and where the culture has been brought to a high degree of perfection, under a climate, too cold to be favorable. It has been long settled that the close pruning practiced in France will not answer here—and probably other parts of the practices of that country are as unfit to be introduced into this: but nevertheless, something may be gained from the opinions and practices of others engaged in like pursuits, in situations the most remote, and under circumstances the most opposed to our own. The directions for training vines on walls (*en espalier*) may be useful as well as interesting to many in towns, where ground is scarce and dear, and brick walls are in plenty, and cost nothing.]

The lists of the various kinds of grapes are given in the original language—because consisting almost entirely of names, and the very concise descriptions annexed containing so many technical words, a translation would scarcely fail to be incorrect, and therefore, probably of less use than the lists in French. As presented here, the lists may be, to French readers, useful—and their entire omission will be no injury to the remainder of the article.]

The vine, *vitis vinifera* [Linnæus] is a native of the forests of Persia: the Phœceans brought it to Marseilles, whence its culture was spread into the Gauls. The emperor Julian says, in his *Misopogon*, written in the year 360, that he made very good wine in his dear Lutetia, which was then within the isle of the city [of Paris].

The vine remains low in cold and temperate countries; in warm countries it grows up to the tops of the highest trees. Its culture has now extended into all temperate situations. It does not produce good fruit in the very hot climates of the tropics, nor in cold or frozen regions, that is to say, above 40 or 52 degrees of latitude. France, Spain, Portugal, Italy, Styria, Austria, Carinthia, Hungary, Transylvania, and Greece, furnish the best vineyards in Europe. Besides this quarter of the globe we may mention Cyprus, Madeira, the Canaries, the Azores, and the Cape of Good Hope.

Of all countries, France is one of those which produce wines of the best quality, and capa-

ble of the longest preservation; here are now cultivated yearly more than 800,000 hectares of land in vines, the grapes of which, converted into wines yield an annual product of 761,270,000 francs.

Like most valuable plants, the vine has produced by cultivation many varieties, some for the table, and others for making wine.

1°. Variétés pour la table cultivées à Paris et ailleurs.

1°. *Morillon hâtif* ou *raisin précoce de la Madeleine*. Feuilles palmées, alternes, incisées, petites; grappes petites; grains violets, noirs ou blancs; peau dure; très précoce. Il se plaît au midi.

2°. *Chasselas de Fontainebleau* ou, mieux, de *Thomery*. Grappes à gros grains, peu serrés. Il y a le noir, le violet, le rouge, le rose, le blanc et le hâtif. C'est le plus cultivé pour la table comme étant le meilleur.

3°. *Chasselas doré, bar-sur-aube* ou *raisin de Champagne*. Feuilles laciniées, grandes bien avant; grappes grandes et grosses; grains d'inégales grosseurs, fondans et sucrés. Il mûrit très bien dans le rayon de Paris. Il faudrait, pour qu'il n'arrivât pas en maturité, que les automnes fussent froides. Très cultivé. Situation à l'est.

4°. *Chasselas musqué*. Feuilles de moyenne grandeur, peu découpées; grappes assez grosses, sucrées. Tardif.

5°. *Muscat noir*. Feuilles peu découpées; grappes d'un violet noir sucrées.

6°. *Cioutat* ou *raisin d'Autriche*. Feuilles incisées; grains petits. Exposition au midi.

7°. *Muscat blanc de Frontignan*. Feuilles peu incisées; grappes coniques; grains serrés, fort sucrés et un peu musqués. Très bon raisin. Au midi.

8°. *Muscat rouge*. Feuilles découpées; grains d'un rouge vif ou marbré de jaune ou de rouge pâle, sucrés et musqués. Mûrit bien.

9°. *Muscat d'Alexandrie* ou *galle longue musquée*. Feuilles dentées, incisées; grains ovales, musqués et de la grosseur d'un œuf de pigeon. Au midi.

10°. *Cornichon blanc*. Feuilles grandes, peu découpées, cotonneuses; grappes allongées et grains sucrés en forme de petit cornichon. Très bon raisin, mûrit très bien à Paris.

11°. *Verdal*. Grains à peau mince, sucrés. Au midi.

12°. *Cornichon violet*. Grains sans pépins jaunes. Exposition très chaude.

13°. *Vigne de Ténériffe*. Nouvelle variété; grains ovoïdes, et d'un violet foncé très clair. Mûrit en septembre.

14°. *Vigne d'Ischia*. Nouvelle variété donnant deux récoltes par an dans le midi.

15°. *Raisin de Corinthe*. Grappes bien fournies et allongées; grains ronds, petits, sans pépins et sucrés. Exposition très chaude ou, mieux, mettre la serre portative devant le treillage.

16°. *Verjus, gouais* ou *bordelais*. Feuilles grandes, fort découpées; grappes grosses; grains ovales ou oblongs, noirs, rouges ou jaunes, sucrés.

17°. *Saint-Pierre*. Grains ronds, blancs et gros. On taille les deux derniers à cinq yeux: on les consomme en confitures, et on en exprime le suc nommé *verjus*.

Telles sont les variétés pour la table: on les plante au pied des murs sous le chaperon; on les

plante aussi au milieu des jardins et dans les champs, mais alors on les échalasse.

II. Variété pour faire le vin, cultivées aux environs de Paris, dans le milieu des jardins et des champs.

Le meunier, le morillon, le murlot ou languedoc, le plant du Roi ou bourguignon, la feuille ronde ou bourguignon blanc, le meslier, le manzard, la rochelle noire et blonde, les muscats, le gris-mêlé, le petit-goy, le sansmorillo, le gamet, l'ericé, le gouet bleu et le gouet rouge: ces deux derniers tournent au gras: on les mêle avec d'autres vins pour qu'ils se conservent: on y cultive aussi le petit muscadet ou pineau gris, qui est une variété mixte.

Il serait fort long de faire l'appel de toutes les variétés préférées et cultivées dans chaque département où la culture réussit le mieux: je ne parlerai que de celles qui donnent les meilleurs vins.

D'après Bosc, on cultive dans le département de l'Yonne, à Auxerre, Migraïne, Tonnerre, Chablis, Joigny, Cussy, Coulange, Sens, Avalon, etc., les variétés suivantes: le pineau noir, blanc et gris, le plant vert, le tresseau, le romain, le plant d'Orléans ou teinturier, le pineau de Collonges et le gamet.

Dans le Bas-Rhin, à Weissembourg, le rouge ordinaire, le rouge de Bourgogne, le rouge de Lamberlsloch, le treutsch, le kleinhengot, le schoemberg, le dreymoener et le roesling.

Dans le département du Jura: le raisin perlé le pineau ou franc morillon, le petit baclan, le tresseau, le meunier, le petit gamet, le muscat noir, le sauvignon, le savagnin, le fromepseau gris, le chasselas et le raisin dit la faucille ronde. Il faut voir le mémoire de M. Dauphin, 40^e volume des *Annales d'agriculture*.

En Provence, sur les côtes de la mer: le manosquen ou teoulter, l'union noire, l'olivette noire, le plant d'Arles, le brun fourca et le petit brun.

En Provence, dans la plaine: le catulan, le morvèbre, le bouteillan et l'union rouge.

Tous les vins de Provence, foulés séparément, produisent des vins particuliers très bons. M. Julia de Fontanelle a donné un fort bon mémoire sur les variétés et autres vignes que l'on cultive dans le midi de la France; ce mémoire est imprimé dans la *Bibliothèque physico-économique* et dans le *Journal de chimie*. M. Antoine David mérite aussi d'être lu: son mémoire se trouve chez Madame Huzard, rue de l'Eperon, à Paris.

Dans le département du Gard, 1^o dans la Vannage: l'alicante, l'esparg, l'ullade, le piquepoule hâtif, l'ugne, le calitor, le moutan, le spiran, le terré, le maroquin, le muscat rouge, le piquepoule-bourret tardif, le terré-bourret, la clairette et la madeleine; 2^o à Saint-Gilles: l'esparg, le granache, le terré, le moureau, la rullade, la clairette, le picarnaud et le gallet; 3^o aux côtes du Rhône: le piquepoule, le terré, le pétarcou, le moutardiers, le marquins et la granache.

Variétés les meilleures, d'après Bosc, que l'on cultive dans la pépinière du Luxembourg et les pays où ils prospèrent le plus.

Le bérardi (Vaucluse.)

Le dolceto (Pô.)

L'épicior petit (Vienne.)

Le luisant vert (Doubs.)

Le pied-de-perdrix (Hautes-Pyrénées.)

Le trousseau (Jura.)

Le pineau de Bourgogne (Côte-d'Or.)

Le franc pineau et pineau noir (Seine-et-Marne.)

Le meunier (Paris.)

Il y a encore des variétés particulières à bien des localités qu'il serait trop long de rapporter: elles sont décrites par MM. Rozier, Duhamel, Gorcey, Noisette, etc.

Greater success is always obtained from varieties cultivated in the north and transported into the south, than from those of the south transported into the north, because the varieties of the north ripen more surely in the south, than those of the south do in the north.

All the varieties delight in calcareous, sandy, flinty or rocky soils; in granitic sands mixed with vegetable earths, in volcanic earths, and finally in all dry, warm and light lands, lying on slopes, and reflecting heat; they also require an exposure to the sun and wind, and towards the south. Under these circumstances, in all places, are obtained the most delicate and richest grapes and wines; they are but of middling quality in shaded situations as well as in very stiff lands, and are not produced at all in watery soils.

The vine is propagated from the berries, from slips, layers, and grafts.

1st. *Propagation from the seeds.* This method produces the varieties which best resist frost. The seeds are sown in March on the open ground or in earthen pots; the sowing is covered with straw after the seeds have been covered with the earth of the surface, or, if it is preferred, after having covered the seed-bed with a layer of mould or fine earth. The seed comes up in ten days. In winter the beds are covered with straw the first year, that the frost may not injure them; the plants are set out the second or third year; the land which is to receive them is broken up to the depth of seven decimetres (two feet) if the vegetable earth is as deep. This method of propagation is very slow and very little used, because no fruit is gathered till the third or fourth year, and it is only by the fruit that it can be known whether the grape is good or bad. In this uncertainty, the other modes are preferred.

2d. *Propagation from slips.* There are two sorts of slips: the slip *en crosselette*, (that is, with a portion of older wood attached to it,) and the simple slip.

a. *Slip en crosselette.* This slip is made of the lower part of the watersprouts furnished with five or six eyes and three centimetres (one inch) of two year old wood detached from the branch of the mother vines, well filled with sap. These slips are cut in October or at the time of pruning: if they are cut in autumn they are kept buried in moist earth until they are planted. The time of planting having arrived, that is in March, the slips are cut at from four to six millimetres (two or three lines) with a keen edged knife, upwards and above a good eye, and they are planted in dry soils; this operation is postponed till April if the land is a little wet. In the south of France this planting is done in autumn, as soon as the slips are taken from the vines.

The distance at which the plants are placed from each other, in the north and in the south of France varies according to the fertility and temperature: it is necessary that they should be sufficiently far

apart that the roots may draw nourishment from the adjacent earth without injuring the neighboring plants, and that the air and light may reach them and circulate without obstacle. At Paris the slips are planted in the fields, up to the last eye but one, at the distance of sixty centimetres (two feet); in the south of France they are planted at ninety centimetres (three feet); the whole plantation is covered with straw that the sun may not dry the land, it is watered, and the watering continued as required. If it can be done, these slips *en crossettes* should be taken from poorer lands than those in which it is intended to plant them, because then the impulse of vegetation will make them take root quicker and better. The ground must have been broken up beforehand, if it was not in good tilth, and also enriched with mould if it was not sufficiently fertile. At Paris, forward vines are always preferable, that the grapes may ripen: for if many of the varieties which are cultivated do not reach maturity at Paris, it is because the climate is not sufficiently warm.

The ground is worked a second time and weeded when it becomes grassy. The slips which cannot support themselves are propped up.

b. Simple slips. A more economical way, says Thöüin,* is to plant simple slips, well filled with sap, nine months old, and of the preceding year's growth: but the produce is slower and less sure, for this reason the slips *en crossettes* should be always preferred.

3d. Propagation by layers. This method is employed to invigorate old vines, to replace those that are dead, and to procure well rooted plants. In March at Paris, and in the south of France in October and November, says Thöüin, they commence by laying bare the roots of the stocks from three to five decimetres (nine to fifteen inches) deep, and twice as much in diameter. The most vigorous branches are chosen, sufficiently distant from one another to be laid down without confusion, the twigs are stripped off from the part which is to be laid down; afterwards the intended branches are placed in the opening, they are fastened down with a wooden fork that they may not get out of place, and their ends are set up nearly perpendicularly on the exterior edge of the hole; the layers are cut off at one or two eyes above the level of the earth. The hole is not completely filled up, that the roots may draw up their juices from a greater depth in the earth, and that the atmospheric moisture may remain and refresh the layers. A prop is set up behind each layer to train it up as it grows. Grass and weeds, as they appear, are removed with the *binette*, which breaking up the land, renders it at the same time more permeable to atmospherical agents.

In the autumn of the year of this operation, or in the spring following, the layers are separated from the stocks, or left untouched; they have taken root sufficiently to support themselves, but it is better not to separate them. This means of propagation is much used in Burgundy, Lorraine, &c.

If it is wished to have grapes on the table in November, layers are made of the branches of vines of the year, which are in pots, by passing

them through the holes of the pots which are filled up with earth. The leaves must be taken off the part to be buried, and four or five eyes must be above the earth; the layer is taken off when well rooted. These pots may be put upon the table the following year when the grapes are ripe.

4th. Propagation by grafts. The vine is grafted in two ways, in a cleft upon the stock, and in a cleft under the crown of the root.

a. Grafting in a cleft upon the stock. This is performed in April on the stock, pretty near to the ground. The stock is split perpendicularly in the middle to the length of six centimetres (two inches,) and the graft, fourteen centimetres (five inches) long, cut into the form of a wedge is introduced and sunk well into the cleft, making the bark of each coincide perfectly, according to M. Poiteau.** The late M. Thöüin† says, that this coincidence is not of absolute necessity, because the sap rises by vessels dispersed in the woody substance. A mould of clay is put around the graft, when the ligatures form knots, they are loosened, and the juncture being well secured, the clay is re-applied. Props are set, the shoots which come out below the graft are cut off, and the ground receives a second working with the *binette*.

b. Grafting in a cleft under the crown of the root. This grafting is made by laying the root bare to fifteen centimetres (six inches) below the first small roots, a perpendicular cleft is made and the graft placed in it, this last is surrounded with a band of rushes and grafting wax. Thöüin says that not five in a hundred of these grafts will fail, and that the stocks furnish many grapes even in the second year, by pruning to five eyes. This is a method of turning to profit good stocks which bear bad fruit.

Thöüin justly complained that enough use was not made of this way of grafting in cultivation on a large scale, it is, nevertheless, an excellent mode to renew vines while improving the nature of grapes.

Pruning vines en espalier [trained against walls] at Paris. Vines are pruned in February, if there is no frost, and not earlier. It is no longer considered good practice to prune vines or trees in the months of December and January; the least frost having affected the whole opening, would attack the wound made by pruning, would first destroy the extremity of the branch, and thus affecting the adjacent bud, would injure it. Skilful cultivators‡ recommend that there should be no pruning till, all danger from frost being over, and the sap ready to move, the succeeding vegetation may either repair the nudity produced by the chisel, or cover the incision made by the pruning knife. Columella§ knew this, and advised that vines should be pruned in the spring in cold climates, because they produced more grapes, and that they should be pruned in autumn in warm countries.

The stocks planted are cut down, the first year, to two eyes; the second year they cut off all the shoots from the bottom, only the strongest and straightest is reserved of which the main stock is formed—this is cut down to three decimetres (nine

* Le bon jardinier.

† Cours de culture et de naturalisation des végétaux.

‡ Thöüin, Noisette, Oscar, Leclerc.

§ Economie rurale liv. IV. chap. X. et chap. XXIII.

* Cours de culture des végétaux.

inches) in height, only three eyes on its upper part are left, and all those below are rubbed off; the uppermost of these eyes is destined to furnish the shoot which is to continue the vertical stock, and the two lateral eyes to produce the first two mother branches of the bottom of the vine. They train the shoots as they grow in the directions they are to keep, the two lower are led as much as possible to opposite directions, and the upper placed perpendicularly on its base. The eyes which produce shoots are rubbed off.

At the second pruning the perpendicular stem is cut down to six or eight eyes, and the two lateral shoots to four or six; on the former only the upper shoots are left, and on the two others, only the two eyes which are below each cutting; all the rest are rubbed off. The three eyes of the vertical stem are intended to supply the second lateral range and the continuation of the principal stock; the others reserved on the first mother branches give on each side the shoot which is to continue them to a first rising branch. The rest of the prunings are made on the same principles as the second, till the whole *espalier* is formed. Their object is to lengthen the main stock and the mother branches, to give space to the rising branches on each of these last, and to prune them to one or two eyes.

Pruning of the propped vines at Paris. This consists in binding to props three mother branches; they are particularly examined; the five or six largest shoots of each are taken off to three or four eyes, if they are strong; the middling shoots to two eyes, and the weak to one; the weakest shoots are cut off entirely. If they were pruned to greater length the fruit would not be so large, nor of so good quality, and the vine would not live so many years: no more fruit should be allowed to grow than the vine is able to nourish. Vines are not permitted to grow high in cold and temperate countries, such as Paris, Lorraine, Burgundy, Germany, &c.; but they are allowed to grow in warm countries, the south of France, Italy, Greece, the coasts of Barbary, &c. At *Meaux en Brie* and towards *Lagny* where the soil is very free, rich and stony, (*franche, substantielle et pierreuse*,) the vine is planted in trenches at six decimetres (eighteen inches) apart, and in (between) beds of one metre (three feet.) For two years they plant in the trenches, near the vines, asparagus roots; and on the ridges French beans, chervil, potatoes, parsley, &c. The vine grows in a year four or five decimetres (twelve or fifteen inches) long; it is turned in hoops, and a great quantity of bunches is produced in this way. *Palladius** has described this form. The props are one metre thirty centimetres (four feet) long; they are sharpened at both ends, that if one should happen to break, the other may be used; they are forced into the ground by the arms of the laborers, and the fatigue of this work is astonishing. It is true that they are aided by a sort of harness, but this does not preserve them from attacks of spitting of blood, of hernia, consumption, &c. It appears to me that it would be better to sharpen the prop at one end only, and make use of a mallet to drive it into the ground.

Culture and pruning of the vine en espalier at Fontainebleau and at Thomery. Before entering

into the details of this culture, I think it necessary to describe the position of these two places.

Fontainebleau, a town in the middle of the forest of the same name, which contains 16,436 hectares of land, is by its situation defended from winds and cold, and in the best position for the culture of the *Chasselas*.

Thomery, a village two leagues to the east of Fontainebleau, is situated on a hill to the east and north, a little sloping towards these two quarters; it is separated from the Seine by a small meadow always overflowed in winter, and surrounded on all sides by the elevated parts of the forest which shelter it from the winds and other atmospherical phenomena.

The *Chasselas* has been cultivated at Thomery only forty years; before that the village did not exist—there were only some isolated houses. The population at present is one thousand, and this small number of skilful and industrious inhabitants furnish Paris with all the *Chasselas* it consumes.

The *Chasselas* of Fontainebleau and Thomery has always a very thin skin, and a large and very sweet berry: that of Montreuil-sous-Bois, which comes nearest to it, is smaller, and the skin is less delicate; but it is also a good grape. At Thomery, the *Chasselas* produces as abundantly in sandy and stony lands, as in free and rich (*franches et substantielles*) soils, which proves that it is the situation, and not the soil, which brings it to that state of excellence; the pruning also appears to contribute to it. It is probable that by cultivating the *Chasselas* in a similar situation, and pruning it in the same way, the same product would be obtained. The following is the culture and mode of pruning in these two places, according to Mr. Poiteau,* added to the notes of the most skilful vine-growers in the country. The *Chasselas* is cultivated on walls two metres sixty centimetres (eight feet) high, with a coping jutting out three decimetres six centimetres (eleven inches) and rough-cast with white mortar. This jutting has been given to the coping only within the last five years: formerly it was not greater than two centimetres (six inches.) Even now almost all the walls have the old coping, but when the grapes are upon the point of ripening, the cultivators put slates between the tiles, and in this way make as good a substitute as they can for the new jutting, as a protection from the burning sun when the grapes are almost at maturity: but on the walls built now, the jutting to the coping is always three decimetres six centimetres (eleven inches). The planting of *Chasselas en treille* against walls is made in a southern exposure; the exposure to the east is not less good.

Ten or fifteen days before planting the vines, the ground is broken up near the wall to the depth of sixty centimetres (two feet.) and to one metre thirty centimetres, or one metre sixty centimetres (four or five feet) [from the wall,]† observing, if the land is wet, to give a slope to the working to carry off the rain water from the wall: but it is not wet at Thomery nor at Fontainebleau, and it is therefore unnecessary to give a slope in breaking up the land there. A parallel trench is afterwards

* Le bon jardinier.

†Something seems to have been omitted here in the original, which is supplied by conjecture.

* Economie rurale, Liv. iii. chap. 11.

opened two decimetres thirty centimetres (eight inches) deep, and sixty centimetres (two feet) wide: slips with old wood attached (*boutures-crosettes*) are laid crosswise in the bottom of this trench, the tops are turned toward the wall, and at the distance of four or five decimetres (twelve or fifteen inches) from each other: they are covered* with one decimetre three centimetres (three or four inches) of earth which is pressed down; the ends of the slips are set up, and afterwards the trench filled with earth, or better, with mould mixed with earth. In the following spring the slips are pruned to two eyes, and each supported by a prop; the next spring the principal branch only is preserved, the others are removed. This branch is laid down as in the first year, the others having been taken off; it is pruned also in the spring to two eyes, and in the third year it reaches the wall. By proceeding thus the vine is very well rooted. Afterwards, if the stocks perish, they are replaced by the same slips, but they are buried at only five or six decimetres that they may reach the wall in the second year.

A trellis work is fixed against the wall, and in the spring the first stock is cut off at two decimetres (six inches) from the ground above a good eye: this eye and the one below it, give, each, one branch which is trained upon the wall, under the trellis, by gently bending them, one to the left and the other to the right, in a straight line, as if they both proceeded from the same point: they are fixed and tied with withs of straw or wet rye. It is only the trunk that is not confined under the trellis. Experience has shown that the nearer the grapes are to the wall, the better they become. If bunches proceed and grow under the cross-pieces, they are raised or lowered a little to save them from pressure. When the second stock is sufficiently high, it is cut off, but at sixty centimetres (two feet) and when the two others have also reached the proper state they are cut off, the third at one metre (three feet) and the fourth at one metre thirty centimetres (four feet); but while waiting for them to reach the desired height, these lateral shoots are pruned to one or two eyes to obtain fruit. As soon as the two arms of this second stock have been pruned, the shoots must be removed. The stocks having reached their proper height, and the two last branches being sufficiently extended, to form their arms, the pruning should be finished as described by M. Poiteau.† "These two branches are to be pruned till they are each four feet long; longer than which they are not to be allowed to grow: the pruning is to be so managed as to obtain three shoots placed at the distance of from four to six inches from each other; two of these shoots will be converted into *runners* [*coursons*] at the succeeding pruning, and the third, which is farthest off, destined to lengthen the arm. Care should be taken during the summer, to attach vertically on the trellis, the shoots intended to make *runners*, and to extend horizontally that which is intended to continue the lateral branch [*cordon*.] At the second pruning the two runners will be pruned to two eyes and the terminal branches will be again pruned so as to leave proceeding from it three

shoots at from four to six inches apart; two of these shoots will be trained vertically, and the third extended horizontally, as in the preceding year, and so in succession until each arm is four feet long, when the terminal branch also is to be pruned as a *runner*. Each arm should have eight *runners*, all placed as much as possible on the same side. When the last stock has acquired its two arms, all of four feet each, there will be on a surface of eight feet square eighty *runners*, which, pruned to two eyes, will each produce two branches, yielding each at least two bunches of grapes."

Thus experience has shown, at Thomery, that to obtain more fruit it is necessary to allow no more than one hundred and twenty centimetres (four feet) on each side, otherwise the bunches would grow only towards the extremities and not towards the body of the vine: but it is to be observed, that all the walls situated to the south and the east are taken up with arbors of *Chasselas* alone. Fruit-trees are never seen on such walls; they are planted to the north, where may be found in abundance the English pear, which succeeds astonishingly, the peach of Malta, the *crassane*, (a pear,) the winter *bon-chretien*, &c. It is only within the last six years that advantageous use has been made of walls in this situation.

Culture of the vine on trees, [en hautains.] For many ages the vine has been cultivated on trees in Italy, on the coasts of Africa, in Asia Minor, Greece, the Islands of the Archipelago, &c. To marry the vine to trees imports that they serve it as a support. The trees most employed in this culture are a species of the elm [*orme champêtre*,] of the poplar [*peuplier noir*,] of the maple [*érable à feuilles de frêne*,] of the mulberry [*mûrier blanc*,] and of the almond [*amandier à coques tendres*,] the evergreens and walnut trees are excluded. As in France, the vine grows in all lands if they are not watery.

The land is ploughed, and planted with young trees in parallel lines fifteen metres (forty-five feet) apart; these trees are to have no branches till two decimetres six centimetres (eight feet) above the ground.

When these trees have taken and are well rooted, a trench is to be dug at the foot of each, and in this are to be planted two slips *en crosettes* with roots, and having only two branches on them, at sixty centimetres or one metre (two or three feet) from the tree, but not far from each other; they are to be laid down in the little trench quite to the foot of the trees, and to be set up against them so as to be supported by them. Mago* and Virgil† direct that the trenches should not be entirely filled up the first year; they were right, since the same practice is continued to this day. The *crosettes* should be two or three years old. The space between the trees is necessary, because if they were nearer they would be crowded in their growth. If the browsing of cattle is apprehended, the vines must be enclosed. Cabbage, turnips, lucerne, corn, &c., are planted in the intervals. Palladius‡ recommends to cut off the ends of the roots of the *crosettes* before planting; but it is better not to do so, as this would deprive them of the means of drawing much nourishment from the earth.

*The original has *change* which I suppose a misprint for *charge*.

†Le bon jardinier.

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*Chap. 6, Liv. 5.
†Liv. 3, Chap. 10.

†Geor. Liv. 2.

The vine is pruned, the first year, to three eyes, and cut in the middle of the space between the joints: the following year it is pruned again to three eyes in the growth of the year; and in the same way successively till it has reached the first branches of the trees. Then two of the vine branches are directed into the top of the tree, and the two others are extended, the one to the right, the other to the left, under branches of the tree, to form garlands, which are to unite with garlands on the neighboring trees. The vine is fastened to the trees with some soft ligament that it may not be wounded. By this way of pruning much wine is made, but it is not of the first quality. If it is desired to have the wine as good as possible, but in less quantity,* fewer branches are left upon the vine, and they are pruned shorter; the vine is also directed more towards the top of the tree than under and among the boughs.

The vine having acquired the proper height and the required directions, the pruning consists only in taking out the old branches which have borne, and leaving the new ones; these are pruned to two eyes. The small branches and sprouts which straggle from the garlands are cut off. Every year the vine is united and tied again with rushes.

Every two or three years the trees which support the vines are trimmed; the branches which grow at a distance from the garlands are cut off; the dead wood also, and the small interior boughs are taken out.

M. Loiseluer-Deslongchamps recommends the cultivation of the vine on trees in the centre of France, where it has never yet been so cultivated, a weak wine only, it is true, is obtained, but yet much superior to all the drinks of which wine does not make a part, and a precious resource for persons of small means.

Manures. Vineyards should be manured every two or three years; and only well-rotted compost, or mould which has been used for gardeners' beds should be employed; manure from unrotted dung-hills would communicate a portion of its odor to the grapes. The rotted manures are advantageously mixed with earth obtained from cleaning out fish-ponds, ditches and rivers, with turf, soil of heaths, marl, broken shells, the *marc* of grapes, &c. These manures, very finely divided, are spread in autumn over the whole surface of the vineyard, and they quicken the vegetation. The vineyards are improved also by removing a part of the soil, and replacing it with better.

Tillage. All the lands of vines planted in fields, are worked at Paris in November and December, after having taken up the props and laid them in piles. The *binette* is used which goes one decimetre (three inches) deep into the earth, and the roots of the vine are a little uncovered. The earth is collected in little heaps in the intervals between the vines. The pruning being given in February or March, the land is worked again, but deeply, and the little heaps of earth are made to disappear. If the land is sloping, it is worked diagonally, and the earth is always thrown up rather than down, that the upper part of the vine may always keep the same quantity of earth.

The vineyard is worked three times more with

the *binette*; the first time before blossoming, a second time when the berries are formed, and the third when the bunches begin to ripen: the object of these workings is to extirpate the weeds, that the rain, the gases and light may penetrate the earth and pulverize it. The moss and detached bark are scraped off, particularly in warm countries.

Prepping. In the north and centre of France the vines cultivated in fields, and those not cultivated on arbors in gardens, are propped. This operation is performed after the spring working: the props are driven vertically into the ground with a mallet, at the foot of the vine-stock at one decimetre six centimetres, (three or four inches) to bring the branches together, and to prevent them from being thrown down by the wind; in driving them down, care must be taken to spare the roots and not break off the buds as *Columella** directed.

Blossoming. No work should be done in the vineyard while it is in bloom, that the progress of *fecundation* may not be interrupted; if the vineyard were worked or watered during this time, a part or the whole of the pollen might be carried off, which would occasion the fruit to fall; this frequently happens, on that account, after rains or high winds. M. Oscar Leclerc† advises to make an incision in June, to prevent the fall of the flowers by leading off the sap.

Stripping the leaves. When the grapes have nearly attained their full size, the leaves are stripped off, as it is desired to color the fruit and to develop the formation of the sugary mucus. On vines raised on trellises, all the leaves are taken off which touch the bunches, when there are others a little farther forward sufficient to break off the rays of the sun, without hindering them from entering and giving color to the fruit. The air also then circulates freely; the leaves which masked and touched the bunches wounded them, and served as abodes for the insects which feed upon the grapes, and the light did not penetrate to the bunches. The foot stalks of the leaves are left; the vine-dressers of Thomery and Fontainebleau strip the vines with great dexterity, and fill their hands with leaves in a moment without touching the bunches.

In general, it is necessary to strip off the leaves a little more from vines growing against walls or on hill-sides,* than from those which are in the shade or on moist lands, because in such situations, says Boec,‡ the leaves protect the bunches from cold winds, and preserve the caloric which, passing to the fruit, hastens its maturity. *Columella*§ thought it not advisable to strip off the leaves in Italy in warm districts, and even recommended to shade, with straw, the vines loaded with bunches when ripe, that the heat might not dry them; while he advised to strip off the leaves in colder places that the grapes might ripen and not rot.

Enemies. Many insects destroy the vines and eat the grapes.

The *pirale de la vigne*.|| The larva lives upon

*Economie rurale, Liv. ii. chap. 2.

†Annales de la Société d'Agriculture.

‡Cours complet d'Agriculture.

§Economie rurale, Liv. ii. chap. 2.

||As the insects are described, it is thought best not to attempt to give them English names, and the translator's ignorance of entomology might occasion mistakes, if it were attempted.

* *Qualité* in the original, evidently for *quantité*.

† Annales de la Société d'Agriculture.

the vine, it rolls and eats the leaves, the stems of the leaves, and of the grapes. This caterpillar, says *Bosc*, is green, with a yellow spot on each side of the first ring, and a black head; it causes much damage in the environs of Paris and elsewhere. *Robergeot* directs for its destruction, in the butterfly state, to make fires as the night comes on; the butterfly is attracted to them immediately and burned. The fires are repeated frequently, and destroy at the same time the *bombyces*, the *noctuelles*, the *phalena*, and other insects which fly in great numbers into the flames.

The erineum de la vigne. Every body knows this (parasitic) plant, which appears on the inferior surface of the leaves in the form of spots, at first white and afterwards red and irregular; it destroys the leaves; the remedy is to pull off those that are attacked and burn them.

The teigne de la vigne. The larva, called vine-worm, lives in the berry, and proceeds, says *Bosc*, from one to the other by spinning itself a gallery of silk. The damaged berries and galleries must be taken off and the whole burned.

The eumolpe de la vigne, gribouri, or coupe-bourgeon. This eats the shoots, rolls the leaves, and deposits its eggs which are hatched into worms. The parts attacked must be taken off and burned.

The Sphinx de la vigne. The larva eats the leaves; but it is rare. The remedy is to remove the leaves and burn them.

The attelabes vert et cramoisi. These two insects in the state of larvæ eat the leaves, the leaf stalks, and the stems of the fruit. The injured parts must be gathered and burned. These insects are called also *urbère, diableau, bêche, lisette, velours vert, and destraux.*

The hanneton. The larva, under the name of white worm, gnaws the roots of the vine and kills it. The earth should be dug to find the worm. It is said that if lettuce is sowed near, the worm will quit the vine to seek the lettuce.

The *wasps* and *drones* are also very troublesome; they should be killed by smoking them with a bundle of straw. Bottles of water sweetened with honey are also hung up in which they drown themselves.

Snails and *slugs* eat the leaves; they should be collected in the morning and after rains, and removed from the vineyard.

Many birds feed on grapes, the thrush, the starling, the lorio, the linnet, &c.; these must be frightened by scare-crows or killed.

Forward grapes, (primeurs.) To obtain these at Paris, from the grapes on trellises, fifteen days before the period of ripening, an annular wound is made on the vine when it is on the point of maturing its bunches.

Grapes are also obtained twenty days earlier than those on trellises, by placing the vine in a green-house, or other place where it never freezes: the vine stock is brought out through the wall. When the vine is in bloom, the young bunches are inserted into transparent glass bottles; the grapes, heated by the sun, ripen early, and when they are ripe the bottles are broken. But the most expeditious method is to place a portable green-house before the trellis, that the sun may shine upon the glasses and warm the vine; a fire also is kindled.

The vintage. The grapes are known to be ripe

when the stem has become brown, and the berries fall at the least touch; the juice is then sweet, sticky, and sugary: the fruit is gathered in fine sunshiny weather, and the bad berries should be taken away.

About twelve days before they are ripe, a greater or less number of bunches are enclosed in bags of hair-cloth; in this way they are kept till hard frosts, and are protected from the birds.

Preservation. Grapes gathered a little while before they are ripe, are kept in square oaken chests lined with lead, and of any required size; they are lifted by iron rings. In the bottom of these is first placed a layer of moss, and afterwards a layer of grapes, without wiping them, at four millimetres (two lines) apart; this is continued till the chest is full. The chests are closed hermetically, to prevent the air and light from penetrating: when this is finished they are let down into a well, each attached to a chain, and they are suspended near the water. When grapes are wanted, the chain is drawn up, they are taken out, the chest closed again, and again let down near the water. These grapes keep till February if no water enters the chest.

Grapes are kept also by putting the bunches on hurdles spread with wheat straw: they are laid side by side without touching or having been wiped. The hurdles are afterwards set in the sun, if it shines; the bunches are turned, and when the moisture has evaporated, the hurdles are placed in the fruit loft.

H. TOLLARD.

[Since receiving the foregoing translation, we have noticed the following passage in the Horticultural Register of Boston, which refers to some of the practices described at large in this article.]

"The mode of training the vine at Thomery, appears to have originated from the well-known and singular fact, that an extended vine produces not fruit except at its *extremities*. That a vine carried beyond the bounds of a limited extent, ever becomes barren at its base. The system of training and pruning, which is there practised, and with such signal success, may therefore be considered as the perfection of every mode which has ever been devised.

Thomery is a village near Fontainebleau, and but a few leagues from Paris. Its grapes, with which the markets of the capital are supplied, are proverbial for their superior excellence. It will appear evident, that this justly merited celebrity, is not due either to the superior quality of the soil, or to its favorable exposure; but the *management* of their grapes *alone*. For Thomery has not a happy exposition; the quality of the soil is inferior, in many parts steril. It is on the side of a hill, facing north and east, and sloping to the river Seine, which washes its base; the soil is clayey, cold, and almost incredibly hard to cultivate."

From the Genesee Farmer.

CURING CORN FODDER.

It has been a generally received opinion among farmers that corn fodder should be perfectly cured before it is placed in the stack, or mow, to prevent the accumulation of mould on the stalks. In this, I had always acquiesced, but an experiment invol-

untarily made, has gone far to convince me that my former views were erroneous. Being compelled to put up my corn fodder in a damp state, I had but small hope of its proving of any utility in wintering my stock, but was happily disappointed by the trial.

When I commenced feeding it out, much of it was entirely covered with white mould, and some quite rotten, yet to my surprise it seemed to have acquired additional attractions thereby, as my cattle devoured it with greater avidity than they did that which acquired no mould. I have often remarked, that cattle would show a marked preference for hay near the bottom of a mow, which had undergone a greater degree of fermentation than that nearer the top, and generally denominated "*mow burnt*." Without philosophizing on this point, I would barely suggest the inquiry, whether by thus carrying on the fermentation of food previous to its being fed to cattle, an advantage is not gained in the increased facility it imparts to the process of digestion?

I. D.

ASHES AND GYPSUM AS MANURE FOR CORN.

To the Editor of the Farmers' Register.

Amelia, February 27, 1835.

A gentleman living in Maryland, on the Patuxent River, made last year twenty-five barrels and some pecks of Indian corn to the acre, on many acres. This remarkable crop seems almost wholly attributable to his manner of manuring, as his planting, culture, &c., do not seem to be different from many others. He prepared his land well; (it was a clover lay,) laid it off both ways, five feet by two and a half; dropped three grains of corn in each check, and with the corn, put a handful of leached ashes mixed with plaster of Paris, (in the proportion of one of plaster to two of ashes) in each hill or check; cultivated it both ways well with the plough, and hoed well. The amazing product seems to me to be principally attributable to his peculiar application of manure, and why cannot we farmers of Virginia pursue the same plan? No plantation on which ten regular fires are kept, could fail (with care) to produce 300 bushels of ashes after the lie is taken from it: this, with 90 bushels of plaster added to it, would manure after the above manner, at least 30 acres. Suppose these 30 acres should produce ten barrels to the acre, (of which I see no reasonable doubt,) can we desire a better application of labor and money? But if 25 barrels be made in Maryland, why not in Virginia? I feel entirely convinced, that no effectual scheme of general improvement can be suggested, which does not contain some feasible plan for lessening the culture of Indian corn—I do not mean to lessen its consumption, but to reduce the surface necessary to produce the quantity required for consumption. He who owns a firm of 300 arable acres, and ten effective hands, with six work horses, will find 300 barrels of corn necessary for his annual consumption. To make this quantity he will, on the average of farms, (between tide-water and the mountains,) put in corn, from 100 to 130 acres of land—and with this large field, would as often fail to make the requisite quantity, as succeed. Suppose, by any plan, 30 acres would produce as much as the 130, the

benefits need not be pointed out. I am not supposing the plan above named, is itself to make the land rich. But what farmer does not see at once, what a vast deal of labor he would thereby be enabled to direct to other purposes than making corn. Every observing man knows that from the first of May to the fifteenth of July, the farmer is perpetually on the stretch to keep in good order his field of corn. He has no time to save hay—is hurried in his harvest—collects no materials for manures—and indeed neither does, nor can do any thing but work his corn.

There can be no reasonable doubt, if we are to believe the experience of others elsewhere, that any farmer now making 300 barrels of corn on 100 or 130 acres, has the means of making the like quantity on 30 acres. Nay more, every observant man knows, that he has acres every year (not many to be sure) that actually do produce at that rate, or nearly at that rate—and yet so universally are old habits, that we find it impossible to resist the absurd one of planting our usual crop, although we know that one-third, if not one-half of the field, will not repay the expense of our ploughing.

I would now suggest, through your Register, to my brother farmers in middle Virginia, (especially) to make this year a small experiment—to take one-tenth of their usual field, and manure and cultivate it after the manner so successfully pursued in Maryland, and observe the result. If land which usually produces three barrels of corn, shall by this method be made to produce ten, (of which I have no doubt) I am sure a new impetus, under favorable auspices, will be given to our agricultural improvement. Even if so favorable a result should not follow, the labor will not be lost. I am now collecting ashes, for at least 30 acres—if we should live until the autumn, I will give you the results.

H. M.

From the Louisiana Journal.

DIFFERENCE OF PRODUCTIONS ON THE HIGH AND ALLUVIAL LANDS OF LOUISIANA.

It must be apparent to every reflecting mind, who is acquainted with the localities of the state, and is the least conversant with agriculture, that the culture which will suit the alluvial parishes, will not answer in the eighth judicial district. We speak on this subject knowingly, for we have observed the staples grown in the alluvial parishes, and in the highlands. It is even now questionable whether cotton can be grown on the Mississippi lower than the parish of St. James. In that parish we have seen cotton growing that looked well. In Washington, St. Tammany and St. Helena, the rye is raised to an advantage; yet in West Feliciana and East Baton Rouge, we apprehend it would make but a sorry crop, while in the alluvial parishes it would be utterly profuse.

If we are correctly informed, many efforts have been made to introduce the improved breed of cattle on the coast, below Baton Rouge, all of which have proved abortive, because the stock imported had died the first summer after their introduction. Yet we are warranted in saying that the same breed of cattle have lived and prospered on the highlands, not exceeding twelve miles from the Mississippi. Swine, it is well known, will answer no valuable purpose on the alluvial lands of the

Mississippi, below the Manchac. An effort is now making to introduce the *thin rind* hog into the parish of St. Helena, and we do not entertain a doubt of its entire success. Many are the abortive attempts made in the culture of the grape, on the banks of the Mississippi. Yet a grape, delicious to the palate, and capable of producing excellent wine, is indigenous to the parishes of Natchitoches, Claiborne and Ouachitta. So it is found that the rich lands around New Orleans is not favorable to the culture of the sweet potato—whereas the pine woods is the soil in which that vegetable most delights.

As with the vegetable, so with the animal kingdom. No domestic animal, calculated for service, or the table, is reared with the same facility on the low, as on the highlands. The feathered tribe we believe is an exception to the rule.

HINTS ON SHEEP HUSBANDRY.

Selected and collated for the Cultivator.

In an agricultural view, simply, the importance of sheep is extreme; since, by their assistance alone, thin, barren, upland soil, so often the far greater part of a country, can be cultivated to advantage, which otherwise could not generally be cultivated at all. The sheep will subsist and multiply on those barren soils, where no other animal would be maintained with equal profit: he is equally calculated for the most deep and fertile, challenging competition, and dividing the palm of profit with an ox, and is excluded from such only as abound in stagnant water, the moist exhalations of which are naturally destructive to his constitution.—*Lawrence on cattle.*

The *bodily constitution* of the sheep, as of the goat, the deer, the camel, the hare and the rabbit, is usually called hot and dry; we however know, from unquestionable experience, that dry soils, a dry air, dry provender, and green food, which does not abound in cold and watery juices, are most appropriate and salutary to them. Indeed the contraries are replete with danger to the sheep, most particularly, which is naturally and constitutionally subject to serious effusion, producing a dropsy of peculiar kind, either universal or circumscribed, but more usually the latter, extending indifferently to all parts of the body.

This efflux of water, or rather watery tendency, in all the fluids of the body, gradually produces in the solids disorganization, mortification or rot. Catarrhal affections are the most usual primary causes of rot. These ideas very plainly indicate the proper situations, food and treatment of sheep.

Sheep have often been described as, of "a weakly constitution, liable to be exhausted by fatigue, and ill able to bear the extremes of heat and cold, subject to many diseases, most of which are contagious." Such notions are to be received with much allowance, for in truth, this useful race seems ennobled by nature to accommodate itself to all the vicissitudes of climate, and to nearly the extremes of heat and cold, of which the husbandry, ancient and modern, of both northern and southern countries, forms the best proof. We see them accustomed to brave the most rigorous of these extremes unhurt, liable, as might be expected from

the nature of the case, to casualty and loss, which timely shelter might prevent. The sheep well fed, from its fleecy covering and gregarious habits, whence results an atmosphere of considerable warmth, remains very little affected by intense cold, if unaccompanied by moisture; he is perhaps more unfavorably affected by great heat, but continues safe under either extreme, with the advantage of sufficient shelter, obviously one of the most important points in sheep husbandry. The various diseases incident to sheep have their origin almost exclusively in neglect, improper situations and treatments, or errors in feeding. Reverse these, and diseases among sheep would be as few and rare, as they are now numerous and rife throughout our sheep districts; another grand point in their husbandry.—*Id.*

From the Cultivator.

INDIAN CORN.

There is no crop which habit has rendered more indispensable to the wants of our families and our farms than this. The late John Taylor, of Virginia, termed it our "meat, meal and manure." Holding this high rank in our farm economy, it is a subject of moment to adopt the best mode of culture. As many districts are shy in producing wheat, and as this crop is seriously threatened by the new (to us) wheat insect, it becomes more a matter of solicitude to render our corn crops productive. But as this grain demands more labor in its culture than other grain crops, so it is more important, on the score of profit, that it should be well managed: for if thirty bushels an acre, be considered only a remuneration for the labor bestowed on the crop—all that the product falls short of this must be a loss—and all that it exceeds, a net gain to the cultivator. The first consideration in regard to the corn crop, is to give it a dry mellow soil; the second, that this soil be rich, fat or fertile; and the third, that the seed be timely put in and the crop well taken care of. Neither wet grounds, nor stiff clays, nor poor grounds, will repay, by their product, the labor required on a crop of corn. He who has no other lands but these, should not attempt to raise it as a field crop. He had better bestow his labor upon other objects, and buy his corn. We think the best preparation for corn is a cloverlay, well covered with long manure from the barn-yard, well ploughed—and well harrowed. It is better to give sixty loads of dung to three acres than to ten, upon the ordinary lands of our neighborhood. The difference in product will not make up for the difference in labor. Corn can hardly be dunged too high. What we have to recommend, that is not common in the culture of this crop, is—that double the usual quantity of seed be applied—the number of plants to be reduced at the weeding—in order to ensure three or four stalks in each hill; that the roots be not broken, nor the manure thrown to the surface, by the plough, but that the harrow and cultivator be substituted for it, which will sufficiently mellow the surface and destroy weeds; and that the hills be but slightly earthed. By ploughing and hilling we conceive the manure is wasted, the roots broken and bruised, and limited in their range for food, the crop more exposed to injury from drought, and the labor increased.

If the fodder which the stalks and shucks afford is an object to the farmer, as they certainly will be when their advantages are appreciated, the securing these in good condition is a matter of importance. To effect this, as well as to secure the crop from the effects of early autumnal frosts, we recommend the practice we have long and satisfactorily followed, of cutting the crop at the ground as soon as the corn is glazed, or the surface of the kernels has become hard, and of immediately setting it up in shocks to ripen and cure. This we have always been enabled to do early in September, and once in the last week in August. The quality of the grain is not impaired, nor the quantity, in our opinion, diminished, by this mode of management, while the fodder is greatly increased, and its quality much improved.

NEW MOVING POWER.

At a meeting of the French Academy of Sciences, on the 16th of June, a very interesting communication was read from M. Thilorier, a skilful chemist, who exhibited to the Academy the apparatus by which he procured a litre (a quart) of liquid carbonic acid in a few seconds. The properties of this substance, he observed, have been but little examined, chiefly because it requires to be confined in close vessels, hermetically sealed, and capable of resisting a great pressure. It surpasses all known bodies in the expansion and contraction which it undergoes from given variations of temperature; from 32 to 86° Fahrenheit, a column of the liquified gas is elongated one-half. With the same change of temperature, a similar column of air is only elongated one-eighth. This enormous dilation, M. Thilorier thinks, will, in future, afford the elements of a moving power infinitely more effective, as well as economical, than that which is derived from the expansion of vapor.

From the Cultivator.

ROOT CULTURE,

Presents many advantages to the stock farmer. Roots are less exhausting to the soil than grain; they are admirably fitted to form a part of a course of crops; are very beneficial in pulverizing the soil; afford abundance of food for farm stock; may be substituted for grain; and serve to augment and improve the valuable product of the cattle yard. An acre of ground, under good culture, will produce, on a fair average, twenty tons of Swedish turnips, mangel wurtzel, carrots, parsnips or potatoes. Supposing a lean animal to consume one bushel a day, and a fattening animal two bushels, the produce of an acre will then subsist three lean bullocks 110 days, nearly the period of our winter, and three fattening ones 55 days.—We merely assume these as reasonable data, and ask, if the result does not prove the profitability of their culture. But we are not permitted to doubt upon this subject, if we credit the testimony of those who have tried them, and whose continuance in the culture is the best proof of their value. Roots enter largely into the system of Flemish husbandry, which has been extolled as inferior to none other, and in many parts of Great Britain, turnips are considered the basis of profitable farming. In our country, root culture is winning its way to notice and to favor. Few who have managed it ju-

iciously have been willing to relinquish it; while others are annually commencing it. The great obstacles to the more rapid extension of the culture among us, is the want of experience, the want of proper implements, as drill barrows, cultivators, &c., and the labor of securing the crop in winter. The apparent magnitude of these obstacles is daily diminishing, and we shall ere long discover, that the root crop may be cultivated, and secured for winter use, as easily as other farm crops. We have had very little experience in cultivating carrots, parsnips or mangel wurtzel as field crops; but the Swedish turnip has been a favorite crop for some years; and we can truly say, it has been one of the most sure and profitable that we have taken from our grounds.

From the Cultivator.

PRUNING FRUIT TREES.

We deprecate the old practice of trimming fruit trees in autumn, winter or spring. Vegetation being dormant, the tree can make no speedy effort to cover the wounds inflicted by the knife and saw. These wounds, exposed to searching winds, and a scorching sun, become diseases, and often bring on premature decay. Besides, an attentive observer must have noticed, that whenever pruning is performed in the spring, three shoots are often thrown out where one has been cut away, so that the very evil which it is intended to remedy, a redundancy of useless spray, is increased rather than diminished. If pruning is performed in summer, after the first growth, say in the first fifteen days in July, or the last seven in June, the tree then abounds in elaborated sap, the wounds are speedily healed, and amply protected, by the foliage, from the malign influence of the sun and winds. We have remarked in successive years, and the fact is noticed by others, that when a tree is pruned in summer, there are very seldom any sprouts seen to shoot from the parts where the knife and saw have been employed. If the reader will try the experiment of summer pruning upon a few trees, we have little doubt he will agree with us, that it has a decided preference over that performed in any other season. The grand error of our farmers consists in not pruning at all, or only at long intervals, when it becomes necessary to take out large limbs, and in doing this, the axe is too often employed, which mangles the trees so badly that they seldom fully recover from it. Pruning should be performed annually, while the limbs to be taken off, and the spray, are small. The operation is then trifling and safe, and the wounds speedily heal. We want no better evidence of a slovenly farmer, than to see his fruit trees so enveloped with suckers as to render it doubtful which is the parent—a case which, bating a little fiction, is often witnessed by the traveller.

From the New York Star.

A NEWLY DISCOVERED CEMENT.

Mr. Ohadiah Parker, a native of New Hampshire, and for many years past a respectable resident in Onondaga county, in our state, and now in this city, has, after numerous experiments, discovered a composition stucco or cement—which, from a state of liquid mortar, hardens in a few

days—say eight or ten—into a solid substance or stone, as impenetrable almost as granite, and susceptible of a beautiful polish. It is, apparently, chiefly of a calcareous nature, or like the hardest kind of marble. Any color may be given to it; and it not only defies, but actually acquires greater density and solidity, and less brittleness, under the changes of the atmosphere. He has obtained a series of patents—and at Catskill, recently was built, as a specimen, the wall of a small edifice eight feet high, which in eight days—recalling to mind the fable of Medusa—was perfectly petrified with its door, windows, &c., all of which is testified to by the owner to us personally, and by the certificate of the judges of the county and the principal citizens of the place. It is impossible to foresee the consequences of such a discovery. It surpasses, without doubt, all other cements; and the material is so cheap, that entire houses, of any shape or dimensions, fortifications, canals, aqueducts, &c. may be thus built up in a few days, which would utterly supersede brick and stone, and effect a complete revolution in architecture. What will not art yet imitate and accomplish?

For the Farmers' Register.

HINTS IN RELATION TO THE DWELLINGS AND CLOTHING OF SLAVES.

In the construction of negro houses it is desirable to combine thorough ventilation with the requisite warmth. The following suggestion may contribute somewhat to that object. Let the under plank of the boxing at the ends of the joists be furnished with hinges, so as to hang loosely off from the house in summer, and occasionally, in mild weather in winter; and at other times to be hoisted and fastened by bolts placed at suitable distances along the inner edge. This pendent lid will not admit rain, and yet afford a circulation of air between the joists, the spaces between which should be left open—thus relieving the room from foul air, which being specifically lighter than that of the atmosphere, ascends. Candor, however, requires it to be stated that in too many of our negro-quarters it is wholly unnecessary to resort to this extraordinary method of admitting fresh air.

On southern estates of much magnitude it is impossible to employ, advantageously, all the females within doors; and besides, with care, women are well adapted to much of the labor of the farm. It behooves us, however, to make them as comfortable as possible; and a large cape of knapped cotton, or some stouter material, descending half way between the elbow and the wrist, will be found extremely conducive to that end. It should be buttoned closely under the chin, but be loose in front. It protects the neck and shoulders, otherwise exposed; is easily put on and off, and but little encumbers the arms when at work.

A SOUTHERN.

WASTE LANDS.

It seems there are upwards of eight millions of acres of waste lands in the Scotch and English counties; or more probably, according to the writer, ten millions of acres, and four millions in Ireland.

ON THE IMPROVEMENT OF AGRICULTURE, AND THE IMPORTANCE OF LEGISLATIVE AID TO THAT OBJECT. DESCRIPTION OF THE SOUTH WEST MOUNTAIN LANDS.

To the Editor of the Farmers' Register.

Charlottesville, March 7, 1835.

Sir—The Agricultural Society of Albemarle, has adopted a resolution requiring one or more of its members, at each annual fair, to present an essay on some agricultural subject. I now send you a copy of the first essay, in pursuance thereof, read to the society on the 31st October last; together with Gov. Barbour's introductory remarks. I am directed by the society, to request their publication in the Farmers' Register.

I am, with great respect,

A. BROADHEAD,
Secretary A. S. A.

Gentlemen.—I avail myself of the occasion, to offer you my very sincere congratulation on the past usefulness, and the present prosperity of our society. While we have to regret the failure in Virginia, of so many attempts kindred to our own, it is a subject of just pride to us, and particularly to those who have persevered from the beginning of our institution, that ours has lived so long; and instead of declining, furnishes at this time, in its increase, a sure guarantee of its successful duration.

Of its past usefulness, we of the society (whose misfortune it is to be advanced in years) are swift witnesses. Such of us can well remember the barbarous system of cultivation that prevailed in our youth, and the consequent desolation of our lands which met us wherever we turned our eyes. Behold now the vivid contrast—striking as between the living and the dead. When I say this, it is not idle vaunting, but founded in sober truth. I am quite sure you will all respond to it affirmatively. The proof of its justness is furnished, not only in the increase of our products, the gratifying spectacle of verdant fields in lieu of frightful wastes, but in the testimony of our brother farmers, who come from afar to profit of your agricultural knowledge, whose boundaries you have so much enlarged. And although I am aware that other causes may have contributed their influence in producing the improvement which has ensued in the country round about, and therefore it is impossible to assign with precision the exact quantum to this society, yet none will hesitate to yield it a large share. In exploring the causes whose result has been so propitious, we are forcibly struck with a fact worthy of particular consideration—and that is, the elevation of our calling in public opinion, and the consequent influence upon the direction of the intelligence of our people. Heretofore, the learned professions, as they have been by courtesy termed, absorbed almost the whole of that intelligence; drawing after them the flower of the land, as being the only road to distinction, and the least laborious method of acquiring wealth. The effect was to crowd to overflowing these vocations. Hundreds, in consequence, who might, by a proper direction of their time and talents, have contributed to the advancement of their country, became a useless incumbrance. This evil begins to diminish, and in a good degree, from the elevation

which has been given to the pursuits of agriculture. We have succeeded in attracting to our standard, a portion of that mind heretofore so unprofitably employed. This will add much to our *matériel* for improvement. For after all, there is nothing, no matter what may be the pursuit in which man is engaged worthy of himself, so favorable to success as intelligence.

While, however, much has been done by this society, and others distributed through different parts of the state, I continue of the opinion, that it is indispensable to that entire success, so essential to the best interests of agriculture, that a professorship of that science should be added to the University, with which should be connected a pattern farm, and a press dedicated exclusively to this noble science and its handmaids. You are aware, that these have long been favorite objects with me, and that I have frequently inculcated the necessity of a united effort amongst our brethren, to effect their establishment by legislative aid. Some few years past, I availed myself of a transient opportunity to invoke, in person, the legislature in their behalf. It was in vain I urged that in a society boasting of its exclusive agricultural character, the legislature had never dispensed the slightest aid to its encouragement; that while the tillers of the earth had paid ninety-nine-hundredths of the cost of the University, their particular interests had been entirely overlooked. That nothing could produce a more beneficial influence, than by placing agriculture among the learned professions. That such an institution would furnish a focus, to which communications would be made; and after passing the ordeal of experiment and intelligence, might be re-communicated to society with the approbation or disapprobation of such unquestionable authority. That there too, every new discovery and invention might be tested, so as to save us from useless expenditures, by avoiding pretended improvements, or at once profiting by such as were really beneficial—that here seeds and plants from every clime might be cultivated, which our patriotic countrymen of the navy are continually bringing amongst us—that here might be solved the interesting problem, whether the grape could be successfully cultivated in our climate, and if favorably, that millions might be saved annually in the article of wine. That the state of society made it fit that these improvements should be made at the cost of the state, as it was obvious from our coparcenary principle of distributing property, and the consequent diminution of the estates of individuals, there would be but few or none able to encounter the risks, and not unfrequently losses, attending all new experiments. That by such an establishment a fine opportunity would be offered for redeeming the pledge suggested at the establishment of the Literary Fund, that a youth from each senatorial district, of promise, and without the means of education, should be adopted by the commonwealth, and educated at her cost. These youths dividing their time between study and labor on the farm, and eventually sent out as shining lights, would impart their knowledge throughout the entire state. In addition, that the rising youth, the future men of Virginia, attending the University might profit alike of the results of study and experiment, and be able at once to direct judiciously, their farming operations, when taking possession of their es-

tates; and by which they might avoid those vexations and losses to which our inexperienced young farmers are so frequently exposed, eventuating not unfrequently in their ruin, and entire disgust of the pursuit itself. That such an establishment under a proper head, would, were the question to be tried exclusively by dollars and cents, be still entitled to favor, as by proper regulations it might in time, by its own resources, meet every expense. And finally, that if patriotism were worth cherishing, there was nothing more favorable to its growth than to make our country worthy of the affections of its citizens—and that beneficent institutions imparting great good to all conditions, presented an object that could not fail to excite the regards of all. To my mortification, these suggestions fell still-born. They appeared as scandal to the Jews, and folly to the Greeks. There was a headlong member condescended to notice merely to denounce them, as smelling strongly of the tariff. In a few days after, an election of a door keeper came on, and I found ten times as much interest as to the result, as had been exhibited touching my proposition, which I thought, and still think, was one of national importance. Indeed, I may here remark, that I have been brought (after long observation, with some opportunity of making just ones,) to the conclusion that our free institutions have been grossly perverted from their original purpose. They were intended as means to promote the happiness of society. It is now no longer the first question, what shall be done—but the one of all prevailing interest is, who is to do it—who shall be our servants, or rather who shall be our masters—to whom are the spoils of victory to be given? The welfare of society, in the violence of the contest, is made quite a secondary question. Hence nearly all are politicians, and I fear a frightful proportion candidates for office. The interests of agriculture, so far as the government is concerned, have been too insignificant in the general strife to receive the slightest consideration. It is therefore with unfeigned pleasure I see in this society, some few at least who have escaped the general contagion, and who devote their time and talents to agriculture. To these I offer the expression of my profoundest gratitude. Ten righteous men would have saved Sodom and Gomorrah. I am quite sure that numbers may be found in this society to whom all that concerns agriculture, may be most safely confided within our contracted sphere. But, if ever the time should come when the stormy elements of party and political strife shall be composed to rest, and our legislators shall direct their attention to the just objects of our political institutions, it may then be worth while for the tillers of the earth by a united movement, to endeavor to make themselves heard in the legislative hall, so as to obtain a portion of that justice of which, as a class, they have been so long deprived. To the end that concert may be obtained, it is devoutly to be wished that agricultural societies may be every where established, embodying all the zeal and intelligence among us, which speaking the same sentiments, and expressing the same wishes, could not fail to succeed in achieving any reasonable project favorable to their interests. Beyond that the tillers of the earth do not wish to pass.

I proceed now to discharge the particular duty assigned me at this session.

I yielded cheerful obedience to the order of the society, which enjoined on me the duty of presenting at this time, an essay on some subject connected with the purpose of our institution. My only regret was that the task had not been assigned to abler hands.

In looking about for a subject, a dissertation on which might not be unacceptable, I have selected the South West Mountains; the rather as they are the abodes of many of us, and to such portion of the society, therefore, they are full of interest. This unique region stretches from the Rappahannock to James River. I have heard indeed of claims to a continuance of this peculiar soil, as reaching further both to the north and south. I can only say, as far as my observation has extended, these claims are not sustained. Its length may therefore be given at 110 miles; its average breadth at 5, and containing 320,000 acres—its latitude in 37° and 38°. Of this tract of land one-half at least, in its virgin state, was very fertile—a fourth sufficiently so as to yield a fair return to labor. The other fourth sterile and rocky, but covered with fine timber—particularly the chestnut, whose duration in rails may be fixed at 60 or 70 years.

The advantages of this region are many, and some of them peculiar. It presents the singular fact that the mountain is fertile to the summit, (1000 feet the highest mountain, Peter's,) and much more so than the country at its base. It is more abundantly watered than any other I have ever seen. Springs of cool living water are to be found in every dell; and on my own estate, I have a copious and lasting spring near the top of the mountain, at an elevation of 600 feet at least. Its vegetation is 14 or 20 days in advance of the level conterminous country; and still it is usually exempt from the late frosts, while the fruit in the level country is destroyed by them. Mr. Jefferson told us "the frost of May 4, 1774 while destroying even the forest trees at the summit and at the foot of the mountain, left a zone of considerable breadth midway the mountain, where even the fruit escaped. The elevations on its western side present the most beautiful sites for building, furnishing, as they do to a great extent, a prospect of the Blue Ridge, distant twenty-five miles, and the intermediate country between; and above all we may fairly claim that no spot on the earth is more healthy. The soil of this region seems equally adapted to tobacco, corn and wheat. All these great staples grow finely here, and come to great perfection. The texture of the soil, in its virgin state, is a dark loam on the surface, varying from two to six inches, reposing on a clay so red as to resemble Spanish brown, and of unlimited depth, in which, as well as on the surface, ferruginous rock (inconveniently in many cases) prevails. It is entirely free from sand. It gives swift proof of the justness of the theory, that all soils have a continued inclination to return to their original condition if left to themselves. For we all know, no matter how naked and full of gulkeys it may be, if uncultivated, it will in thirty years be in condition to bring even fine tobacco—an infallible test of the best land.* These, with many others that might be

enumerated, are the advantages belonging to this favored region.

Its disadvantages, however, are not a few. The land is steep and stony. For although rolling land is preferred for most crops, particularly wheat, it is frequently so steep that the soil, and even part of the crop is swept off by heavy rains. Its greatest difficulty is, the growth of which it is so fruitful, the brier, the locust, the sassafras, and above all, the persimmon, which add excessively to our labor in cultivating our crops, as well as diminish the products. To war against these difficulties successfully, and to reclaim our wasted lands, the result of a barbarous system of cultivation, is an object of the first importance, and to which I wish to call the attention of the society.

The original system of tobacco and then corn, without rest till the land was exhausted, has been generally given up. It was abandoned from necessity. The first, and among the most important improvements was horizontal ploughing, introduced by the late Gov. Randolph—then a judicious routine of crops, the cultivation of clover, the free use of plaster, and the application of straw to the galls. The routine is generally corn, wheat, and clover for two years, following some portion annually for wheat on a clover lay of two years' standing. The exemption of the clover as far as practicable, from the hool; and to this end the establishment of standing pastures would be highly desirable. The cultivation of our corn crops exposes our steep lands to great danger from the heavy rains to which we are subject, and to resist which the horizontal ploughing has been found not sufficient. In the August of 1813, according to the observation of Mr. Jefferson, there fell ten inches of water in 12 hours. The effects were disastrous. So much so that it suggested to me the necessity of adopting some additional means of security, and I think I found them. I began immediately the process of hill-side ditching, which I have pursued ever since, and with great success. This process is particularly beneficial in saving our valleys. The term describes the position between two hills or mountains. Commence the ditch as high up the ravine as you wish, let it reach entirely across the valley, and in such form (that is a crescent) as that the water may be conveyed with such a descent as to keep the ditches open—which are carried on the sides of both hills, descending of course till you reach the bottom, where in the mountains we always find a stream. But I use them with great success in all steep lands, by running them about midway the descent so as to save the lower part, which without the ditch, by the accumulation and violence of the flood, would be destroyed. All the land within or below these ditches, becomes almost as valuable as the valleys, and when cured of their galls is worth \$100 the acre—because they will yield on an average six per cent. annually, net profit, on an investment at that price. Still, however, much is to be done in saving our lands by judicious cultivation apart from hill-side ditching. The plan, once followed, of leaving the balk in clover between the

* It abides drought, and an excess of rain, better than any other lands we have. At the base of the mountain

on the east, there is a bed of limestone, say fifty yards in width, and attending this region through its whole extent.

rows of corn, would have been effectual, but the loss of the corn crop by that plan was too serious; so that it has been abandoned. At least I, after losing two crops on my experiment of that kind, have given it up. And I have in lieu adopted the following. I flush round the hills as deep as possible, then harrow. I then lay off my rows for planting, horizontally with a two horse McCormick plough. I follow immediately the same furrow with a coulter, inserted as deep as possible, cover either with a plough or hoe, and then harrow the whole land with a four-ox harrow. This makes the soil smooth. Immediately on the corn's coming up, I run four or five times with the coulter between the corn rows—two ploughings with the shovel or bull-tongue, and a weeding with hoes, complete the crop. If from excessive rains, gulleys are produced, fill them immediately with straw or leaves, and they speedily recover. Our grand restorative, however, is the clover. Every farmer should save his own seed. It takes much better in the chaff, than clean, and the clover haulm from which the seed has been extracted, when spread on the poor spots, works a miracle in their speedy restoration. But as yet I have found no satisfactory plan, by which successfully to root out the annoying growth to which I have referred. Severe grazing will, in time, pretty effectually destroy all but the persimmon. Nothing will eat that. And for one I am ready to pronounce him a benefactor, who will discover an effectual method of destroying it. To such an one I would vote a premium of the whole funds of the society. Upon the whole, as it seems to be agreed that in the economy of Providence, something like equality was designed in his distribution—applicable not only to the various parts of the globe, but to our moral condition, let us, the inhabitants of the South West Mountains, rejoice and be grateful, that our benefits greatly preponderate over our ills. And as far as my testimony goes, resulting from actual observation of near one-third of the entire circumference of the earth, I feel no hesitation in declaring, that I deem them the most desirable abode I have ever seen.

JAMES BARBOUR.

Barboursville, Orange, Nov. 1st, 1834.

From the [British] Quarterly Journal of Agriculture.

ON THE MANAGEMENT OF LANDED PROPERTY AND SMALL FARMS IN IRELAND.

[The following details of the improvements produced by the exertions of a single judicious individual, among a population so miserable, degraded, and almost hopeless, as the poor tenantry of Ireland, must be interesting to the philanthropist and the political economist, as well as to the agriculturist possessing expanded views. Of all the reformers and benefactors of mankind, the *working* reformers are the most useful. It was because he was a working reformer, furnishing examples as well as precepts, that Oberlin was, within his humble and limited sphere of action, one of the greatest as well as one of the best of men—the one who seems to have more completely fulfilled his duty to God and man, than any of the heroes, the sages, or the saints, whose fame and virtues have been

illustrated by modern history. The agent of the improvements which are described in the following extracts was a mere man of business; but one who has well proved this truth—that the same enlightened and judicious system is best to promote the several interests of the owners, and the laborers of the soil, and also of their country at large. The whole article from which these extracts are taken, is an extended review of two essays by Mr. Blacker, one of which had been honored by a prize awarded by the Royal Dublin Society. The parts omitted here relate more exclusively to the peculiar circumstances of Ireland and of the poor Irish cultivators.]

The principal causes of the inferiority of the agriculture of Ireland, are the want of *minute superintendence* on the part of the land proprietary of that country, and carelessness or want of judgement in the selection of agents.

Few country gentlemen, comparatively speaking, are either disposed or competent to undertake the trouble of introducing an improved system of farming, in defiance of old customs and long indulged prejudices, and fewer still are judicious in the choice of proper substitutes.

The agent, however honorable he may be in principle, and clever in the art of collecting rents for his employer, is too generally ignorant of rural economy; or if not so, he is too frequently without *authority* to act on his own judgement, and under the necessity of acting on a prescribed system of illiberal and defective management. While under the strictest obligation to remit to the absentee proprietor, under penalty of dismissal, a given sum on prescribed days, his representations of any circumstances connected with the actual state of the *rent-roll*, are unheeded and *unfelt*.

The absentee landlords in particular, with a few honorable exceptions, look only to the amount of remittances, and select for their agents, attorneys resident in the metropolis, merely on account of their knowledge of legal technicalities, and their ingenuity in collecting rents at a moderate percentage, without due regard to those more important talents which a land-agent should possess.

It is with reason that we complain on the part of Ireland, of the general indifference which prevails among the agents of Irish property, on the essential points of *minute management* and unremitting vigilance, regarding the condition of cottages, garden husbandry, culture of green crops, planting of orchards, &c.; all which important objects could easily be effected through the instrumentality of active overseers, subordinate to the principal agents, if their time be otherwise occupied.

It is with no ordinary degree of satisfaction, therefore, that we have read the publications of Mr. Blacker on the management of estates. These coming from an Irish agent, we estimate most highly, not so much for the details afforded of remarkable improvements effected on one or two estates, as for the *results* which we confidently anticipate these will produce. The zeal and energy of Mr. Blacker are beyond all praise, and must have a prodigious influence in stimulating to similar efforts the important and hitherto inefficient class to which he belongs.

In the preface to the second of these *Essays*, Mr. Blacker observes:

"For several years I had been turning my attention to the improvement of the tenantry on the estates alluded to [those of the Earl of Gosford and Colonel Clowse,] and had made several unsuccessful attempts to introduce a better system of agriculture, by circulating the different works published on that subject, and offering premiums for [to] those who would adopt the improvements recommended; but I had the mortification to find there were no claimants for the prizes proposed, and that every attempt I made was a complete failure. At length it occurred to me, that by writing a short address to the tenants, their attention might be drawn to the effects of the present system, and by following it up with the appointment of an agriculturist for the special purpose of instructing them; and, moreover, allow him to grant a loan* of lime to such as followed his instructions, for the purpose of replacing the manure which he might require for the cultivation of green crops, and adding my own personal influence, I might perhaps have better success."

This judicious agent, it appears, has acted perseveringly on his own principles, and after circulating manuals of agriculture suited to the circumstances of the tenantry over whom he so happily presides, to prepare the way for practical operations, he proceeded with great earnestness to promote the green crop system, among the small farmers especially, by granting premiums for house-feeding cattle, and by supplying lime, and turnip and rape seed.

In proof that an agent possessing energy of character, and a real desire for improving land property committed to his superintendence, and backed, as in the present instance, by benevolent and judicious landlords, may effect very important results within a few years, we are informed, that, at the commencement of Mr. Blacker's labors—

"There were but two tenants on the estate of the former [Lord Gosford] and none on [that of] the latter, who were able to enter into the competition. The second year there were about fifty competitors; in the third there were not less than 300 or 400, who fed their cattle entirely, or for the most part, in the house; and this year [1834,] from the great quantity of clover seed sown last spring, I think there will be scarcely a tenant on either estate who will not feed his stock upon that plan."

Here is encouragement to the landlords of Ireland. After four years the old mode of taking successive and exhausting corn crops disappears, and a proper rotation succeeds; where weeds had previously occupied the soil clover and vetches are now seen, and turnips (and partially mangel-wurzel) have been successfully introduced.

To effect his objects, Mr. Blacker used (as already stated) a mode of inducement, which we conceive to be precisely suited to the circumstances of the small holders of Ireland—an advance of lime—thus enabling the poor farmer to raise his potato crop without the otherwise unavoidable necessity of applying to this purpose, the contents of his dunghill, which he now can devote wholly,

or in part, to the culture of turnips, rape, or cabbages.

One of the great obstacles in Ireland to the raising of turnips among the small farmers, is the want, in the *first instance*, of a surplus of dung (after the necessary portion of potatoes has been planted) for the desired purpose; the difficulty lies in the *first step*; the substitution of lime meets this difficulty, and ever afterwards the green crop system works easily.

Fully satisfied, however, of the great value of dung (for the growth of potatoes) applied even in small quantities to land limed immediately before, we should prefer the application of some portion of the dunghills in all cases to the potato field. But other considerations must regulate this matter, and we are perfectly satisfied with Mr. Blacker's plan; the result of which has been so pre-eminently successful.

Our excellent agent thus urges the use of lime at the introduction of the green crop system:

"It is therefore of the utmost importance, that when you first begin to *lime*, you should raise your potatoes upon it, and make use of the house manure which this leaves at your disposal, to raise turnips or mangel-wurzel for house-feeding, and increase your stock of cattle to the utmost which this plan will enable you to keep; setting it down for certain, that you ought to have at least one cow for every three acres of arable land, as being the *smallest* stock which will enable you to keep your land in heart, when the resource of lime can no longer be looked to. If this is not kept in view from the very outset, you will find that you cannot manure the one-fourth of your farm every year, and you will therefore be thrown out of the rotation—the land will be exhausted and left to rest as formerly, and as it gets poor you will get poor yourselves; and having no longer the relief of lime to fall back upon, your case will become worse than what it is at present; for *now* by lending you lime, I have no doubt of making you comfortable and independent, if you are only industrious and willing to follow the instructions given you; but *then* this resource is lost to you, and I do not see what other can be made available to you."

Simple addresses to the agricultural classes, such as Mr. Blacker distributed, have their use. Prizes for green crops, which are the great want among the very class to which they would be most beneficial, have also their good effect; yet for one person who is able or willing to read a treatise on husbandry, there are ten disinclined to receive any information that does not come to them practically, and prizes are too often found to answer but a temporary purpose. When the stimulus of reward is withdrawn, the object for which it was proposed and granted becomes neglected; but the substantial aid of manure and seed liberally supplied to a pauper tenantry, and of *cows* to consume the newly created produce, would if afforded on an extended scale, effect much positive and permanent improvement in the condition of the humbler classes of the Irish cottagers.

And to those who may exclaim at the insupportable expense of affording such encouragement, it may be useful to present Mr. Blacker's estimate of cost:

"But what, it will be asked, may be the expense of attempting to follow a plan which, it must be ad-

* By a loan of lime, is meant an advance of a certain quantity of lime, to be paid in money, not returned in kind, as the expression would naturally indicate.

mitted, seems at least to have much to recommend it? To this it may be answered, the expense is trifling indeed, compared with the objects likely to be obtained. Those agriculturists I have hitherto brought, and who have all turned out to be very deserving men, have been engaged at a salary of 25 £ a-year, with a cabin and two acres of land, rent free; or in *lieu* thereof, a lodging, with the Scotch allowance of six and a half bolls of meal, and what milk they might require, all which does not amount to more than 10 £ a-year in addition to their fixed salary. Nothing can be accomplished on a large scale, without having a respectable man in this situation; for the ignorance of the generality of small farmers is such, that they will put out their lime on land not drained, whereby the advantage of it will be lost almost entirely; and they will sow the clover-seed on *exhausted* land, where it will not grow, and will therefore become a total loss; also they have, generally speaking, little idea of what *clean* land is, nor how to set about making it so, and their manure therefore goes to nourish weeds as much, or more perhaps, than the crop sown; for all which reasons, I look upon this appointment as indispensable, where any extensive success is aimed at.

"The next expense to be considered is the advance of lime. In this respect my practice has been to lend it to almost every one who applied, let their circumstances be what they might, making only the stipulation that the instructions given should be strictly followed. I adopted this line in order to show the people that my wish was to benefit every one, and that I was not actuated by the selfish motive of merely aiding the very poor class, in order to lessen my own trouble in getting in the rents. The liberality of my employers enabled me to act on this extended plan, which of course occasioned the greater outlay. But when the landlord is restricted in means, of course the loan will be confined to those who stand most in need of assistance. The advance required depends so much upon the size of the farms, the density of the population, and other circumstances, that it is hard to fix upon any sum per thousand acres, as sufficient for this branch of the expenditure. The more people there are, the more industry is capable of being brought into activity, and the more capital is of course required; likewise the greater the poverty the greater assistance will be necessary; so that the advance required must evidently vary in different estates, though they may consist of the same number of acres.

"But I would hazard the opinion, that in most parts of the north of Ireland, 50 £ per thousand acres would be found sufficient to supply the requisite loan of lime, and provide turnip and rape seed, which I have as yet given gratis. Every poor tenantry will be found so much in debt for their seed-oats, seed-potatoes, and perhaps even for subsistence, and subjected thereby to such usurious charges, that I have found it necessary to give in the first instance three years' credit, in order to get them out of the power of their creditors. The repayment of the sum so lent now forms a fund for carrying on the system, and I do not anticipate being obliged to make further demands upon my employers; but when this credit, from the pecuniary wants of the landlords, cannot be given, I think the repayment might be insisted upon from the produce of the first grain crop after the loan.

My lending of clover-seed was an afterthought; but is a matter of pecuniary importance, and the cost of so large a supply came to such a sum, that I was obliged to limit the credit upon it to six months, which brought the repayment to the time of harvest, and as I obtained the same credit from the London seedsman that I gave to the tenantry, there was no advance of money in that particular, and the advantage has been the greatest that could be imagined, in doing away immediately with the practice of sowing successive grain-crops as already alluded to.

"To sum up the whole then, it would appear, that to make the conviction produced by the perusal of the pamphlet *operative*, all that would be necessary on the part of the *landlord*, would be, an annual outlay of about 35 £ to the agriculturist which would afford the necessary instruction and an advance of about 50 £ a-year per 1000 acres, for three years at most, in lime, to replace the manure taken from the potato crop. This is the entire expense, except the trifling cost of the pamphlets; and when to this the tenant has added his industry, and the agent his influence, the system is complete. I do not in the above calculation, include the trifling sum which the landlord may feel disposed to give the premiums for the encouragement of those who most distinguished themselves by their exertions, nor any occasional assistance he may feel disposed to give in lending a pound or two for a few months to assist a tenant in buying an additional cow, when his clover was superabundant; these being optional matters, and not absolutely necessary."

The usurious prices paid in many places by poor farmers for seed-oats and potatoes, are often most oppressive. Twenty-five per cent. has been frequently paid for the accommodation of seed-oats in spring (of inferior quality too,) to be paid for in the ensuing autumn. By supplying seed, therefore, on *fair terms*, an agent may frequently save a poor tenant from considerable loss, and as to clover and grass-seeds (the latter usually of the worst and most dirty description on the small farmer's field,) these may be supplied by obtaining credit from the seedsman, as Mr. Blacker did, without the actual loss of a single shilling.

It appears from the pamphlets before us, that the tenants thus aided, from having strong motives to exertion, are extremely industrious; theirs is not the hopeless condition of men deep in arrear and without a ray of hope, in apprehension of ejection from their homes, and destitution in consequence, but the happy state of a peasantry full of hope and energy, and enjoying independence, or at least every rational anticipation of it.

On the Cavan estate of Lord Gosford, consisting of 8000 acres, and moderately set, the arrears had been increasing; yet in the second year of Mr. Blacker's operations, the rents of the then current year were discharged, with a *part* of the arrears, and many of the tenants have subsequently paid up all which they owed, Mr. Blacker having made a rule "*never to forgive any arrears whatever*," (unless a retrospective reduction in the amount of rent, calculated with reference to agricultural prices and proportionally granted to all the tenants, be so considered,) which would be a discouragement to those who had regularly paid their rents.

* * * * *

The general maxims (each of them enforced by argument and illustration which Mr. Blacker lays down for observance, are in strict accordance with the most generally received principles of husbandry. We shall insert the heads of them, for although they teach nothing particularly new, they are succinctly and judiciously arranged, and ought to be pressed upon the attention of every farmer.

1. The ground must be thoroughly drained.
2. Weeds must be destroyed.
3. All cattle must be fed in the house or straw-yard upon good food.
4. Two successive crops of the same kind not to be taken.

Under this head are the following observations:—

"I am fully sensible, however, that a system of over-cropping with grain will extract every kind of nourishment from the soil, and leave it so that it will not even yield grass. This is the case with land which is left to rest, as it is called, by those who take three or four grain crops in succession, and the phrase is well applied, for the land is really not fit to do anything. The error of this class of persons is, that they turn the land to grass at the end in place of the beginning of their course. Had grass-seed been sown with the first crop of grain, there would have been a good crop of hay, and good after-grass, and the second crop of grain would have been as good as the first; and this is what ought to have been done by those whose land is not suited to clover, or who from poverty are not able to buy clover seed; and even where two grain crops have been taken, it would be better to sow it with rye-grass, which will yield a crop on very poor land, rather than to leave the ground to be possessed by weeds and such herbage as may naturally rise. The fact is, the last exhausting crop should only be put in upon that portion of the farm which is intended for potatoes, and other green crops, the succeeding year, which crops then give the manure to restore it to a productive state; and by this means there is no land at all lost by what is called resting it."

5. The place for manure should be so contrived as not to be exposed to any accumulation of rain water; but should receive the contributions from the sewers of the house, stable, cow-house, &c.
6. Advantage of straight fences.
7. Levelling of unnecessary ones.
8. The absurdity of keeping horses on small farms, and the superiority of spade husbandry.
9. Formation of ridges.
10. Impropriety of selling straw off the farm.

We are sometimes gravely told that there is no use in sowing turnips in many parts of Ireland, where they would be assuredly stolen. As Mr. Blacker does not touch upon this objection, we are bound to suppose (giving him due credit for strict honor and impartiality in the advocacy of the above case,) that the people around him are not disposed to pilfer turnips to any sensible degree; and indeed, we happen to know perfectly well that a crop of turnips is as safe from spoliation as a crop of beans; but that if either of these be a solitary and unusual crop in a neighborhood teeming with children, a desire to taste it may lead to the abstraction of an inconsiderable portion of them, but the novelty

soon wears off, and the eating of raw turnips or beans brings with it the sure penalty of indigestion and all its painful concomitants, which effectually prevents a recurrence of the practice.

This matter reminds us of a story somewhere told of a farmer in the northern part of Scotland, some forty years ago, when turnip culture was beginning to creep into the country:—He sowed a head ridge for the use of the public; and put up a label with this inscription, "*You are requested to steal out of this spot.*" This hint may be serviceable.

For the Farmers' Register.

MONTHLY COMMERCIAL REPORT.

Money has recently, become very abundant in the large cities, and the consequence is that stocks of almost every description have advanced in price. Exchange on England has risen to $8\frac{1}{2}$ to 9 per cent. premium. The cause of this influx of money is not very apparent here, but could no doubt be explained by the capitalists in the large cities, where investments to an unprecedented extent are made in real estate, and in rail road and other stocks of a similar character.

Speculation will, as usual, probably be carried too far, and when a reaction takes place, it will be ruinous to many.

Agricultural products generally bear high prices, with the exception of grain and flour, which requires a greater foreign demand than has existed for two years past to take off the surplus, created chiefly in the northern and western states. Flour commands $\$4\frac{1}{2}$ to $4\frac{3}{4}$ except that of the city mills, large shipments of which are seeking a market in South America.

The price of tobacco is fully supported—the most inferior at $\$4.25$ and ranging as in quality up to $\$9$. The finer sorts do not yet begin to appear, and will not to any extent until June and July.

Cotton has again advanced, and is now higher than at any period during the last twelve months. Crops embracing good and common qualities sell at 16 cents, and selections at $16\frac{1}{2}$ to $16\frac{3}{4}$ cents. The quantity brought to market in Virginia will be one-third less than in the last season, and may be estimated at about 28,000 bales, allowing 4000 bales yet to arrive. The estimate of the crop of the United States which at one time was as high as 1,300,000 bales, is now reduced to 1,200,000, and it is believed that this quantity will not be more than sufficient to meet the demand.

X.

March 25th, 1835.

For the Farmers' Register.

ON THE PAMUNKY MODE OF MAKING CORN.

However "strange it may appear" to W. B. H. [No. 8 Farmers' Register, p. 466.] "that any one should think the Pamunky mode of making corn the cheapest, or most labor saving," there are some people who still adhere to that opinion. The two or three weedings with the hoe in the Pamunky way, are not more than equal to one in the common way of working corn, and the plough is the chief implement in its cultivation.

But if W. B. H. has been able to dispense entirely with the hoe, and substitute the plough al-

together in making corn, then indeed I must give up "that nothing but the agency of steam" can compete with him.

PAMUNKY.

THE SEASON AND WEATHER.

Since the commencement of the year, there has been an unusually large proportion of rain and snow, and still more of severe cold weather: and the season, to the 24th of March, has been not more remarkable for our latitude, than it has been unfavorable to the farmer's operations and prospects. Besides that the almost continued wetness of the earth caused it generally to be unfit for ploughing, even when not frozen, there have been four spells of cold, each of which, if alone, might have been considered remarkably severe. The first and longest of these was early in January. Of this we have as yet no accurate report of observations by the thermometer—but believe that the cold was not as severe in Lower Virginia, for its latitude and elevation, as elsewhere. At Washington City, the lowest temperature was 16 degrees below 0, and at several places in the state of New York and New England, it was 40 degrees below 0. The weather here on February the 8th, was supposed by many to be the coldest ever felt—and it certainly appeared so, owing to the sudden change from a mild preceding day, and the violence of the cold wind. But in fact the thermometer (at Shellbanks) was but a little below 0, and was still lower the next morning, when it stood at 2 degrees below 0. On March the 1st, the mercury was as low as 5 degrees below 0—and after some warm weather, another change to cold took place on the 23rd, and on the 24th the thermometer was at 28 degrees. On that day, the weather again became more suitable to the time of year.

In consequence of this state of the weather, the ploughing for corn has been unusually late—and it may be inferred, that much of it has been imperfectly or improperly done, owing to the general wet state of the earth. The wheat has suffered severely, and much of it is killed. The clover sowing of those farmers who harrow wheat land for that purpose, has also been very late—but the plants will probably not, therefore, fare worse than those from seed sown early—as the sprouting of these was either retarded as long by the cold—or if sprouted, may have been killed. More or less injury will be inevitable every where, from the past season to all these crops—varying in extent, according to the nature of the soils, and their greater or less liability to suffer from wet and cold.

Vegetation has been so long kept dormant, that it might have been supposed there was now but little danger of the most early or tender blossoms being destroyed by future frosts; and, therefore, that a plentiful fruit year might be anticipated. But if the following statement may be relied on, it seems that the severity of cold has destroyed, instead of serving to protect the germs of early fruit.

The lovers of good fruit will be very sorry to learn, that the prospect of a peach crop this year, has been utterly blasted by the extraordinary severity of the past winter. Upon examination, the vitality of the bud, we are informed, is destroyed, and there will consequently be no bloom. The

same is the case probably with the apricot, and others of the least hardy kind. We understand, also, that considerable injury was done to the wheat by the intense frosts of February, when it was unprotected by any covering of snow. Our climate surely is not ameliorating, as has been generally supposed.—*Fredericksburg Herald*,

"FLORIDA COFFEE"—OKRA.

To the Editor of the Farmers' Register.

Your February number contains another example of the uncertainty of the common names of plants. A gentleman in East Florida speaks of his cultivating a plant which he calls *Florida coffee*. He says it is an annual plant, &c. Now, it must be evident, this is *not* a species of *coffee*, but some other plant, of a very different nature. The coffee plant is a *shrub* which bears its fruit in the form of a *berry*, and the *grains* used in commerce are obtained from the berries. The plant spoken of above, appears to bear its fruit in the form of a pod or legume. It would be desirable, therefore, to know something more of this plant than we can know by the name thus given it. * * *

February 23.

To resume a subject which I mentioned in my last, I now suspect that the plant which the gentleman in East Florida calls "Florida coffee" is the *okra-plant* (*Hibiscus esculentus*), frequently cultivated in the gardens of the southern states, and which (as Mr. Nuttall says) will ripen its seeds as far north as Pennsylvania. The *unripe* capsules (or seed vessels) of this plant, when boiled, afford a delicious article of diet. It is also a good ingredient in most of our *soups*, and constitutes (I believe) a principal one in the famous *gumbo* of the creole French and Spanish of Louisiana and Florida. I have heard that the ripe seeds make one of the best *substitutes* for *coffee*, but the plant itself is much more nearly related to cotton than to coffee. Its flower, which is beautiful, very much resembles that of the sea island cotton. It is a native of the eastern continent, and if it grows wild in any part of America, it must have been naturalized. I have seen it, in Middle Florida, spring spontaneously from the seeds of the preceding year.

H. B. CROOM.

From the Farmer and Gardener.

INCREASED PRICE OF LAND CAUSED BY MARL.

A farm near Monmouth in New Jersey, which was purchased a few years ago for about two dollars an acre, recently sold for thirty. This extraordinary increase of value has been produced by the effect of marl upon the soil. From this, many of our fellow-citizens in the country can infer what treasures they possess, either on their own lands, or within reach of them. Land owners throughout Maryland, are greatly indebted to the legislature for providing for a full geological examination of every county in it.

THEFTS COMMITTED ON THE MAILS.

The editor of the Southern Religious Telegraph has recently published a list of letters directed to him, containing money, which had been stolen in passing through the mails. We could state as many losses of

the same kind, and will henceforth adopt that plan in the receipt lists, in hopes that it may possibly lead to the detection of the thieves. One has recently been discovered (an assistant) in the post office at Cumberland Court House. But he is not the only one who has lately been engaged in such business, as letters containing money have been lost through other routes.

We are content to incur the risk of these and other losses by mail—but hereafter subscribers remitting money *must* comply with the published conditions upon which that risk was assumed, viz: *that evidence be furnished by a postmaster's certificate, or otherwise, of the committing the letter and money to the mail.* As reasonable and necessary as this requisition manifestly is, it has seldom been complied with—and we have, (notwithstanding the omission) given credit for every alleged transmission that failed to arrive, upon the simple and general statement of the subscriber. But though not doubting any of these statements, it is evident that such procedure subjects us to the danger of imposition and also *prevents the possibility of establishing the fact of the theft*, and tracing it to the offender. We therefore shall hereafter admit no payment of money lost or stolen, without the proper evidence and date of the mailing—and it will also be more safe, and serve better the ends of justice, if each remitter of subscriptions by mail will keep a memorandum not only of the date of his letter, but also of the description of the notes enclosed. For want of this means for identifying some of our money which has probably been found in the possession of this public officer in Cumberland, it will go as part of the fee to his lawyers for defending him, instead of to its owner.

It is also requested of subscribers who transmit money by mail to enclose it more carefully, as it is frequently done in such a manner as to expose the notes contained to both the eyes and fingers of any who may handle the letters, and thus unnecessarily to tempt to thefts.

There is one means, which if used, would prevent nearly all these thefts which are now so often committed in post offices. In every case of the kind, the postmaster who employed the thief, (however respectable or honorable the employer may be,) should be displaced—and also be made liable for the money proved to be stolen by his assistant. This would render postmasters as careful of the characters of their assistants, as merchants are of their's. As it is, assistants are trusted with the mails who would not be trusted by their employers with their own "untold money"—and even the postmasters themselves, of very many small offices, are men of small pretensions to character or responsibility. This state of things is a great evil, which surely needs correction, both from the government, and from every individual citizen who knows any of the existing abuses.

THE RECENT ENACTMENTS OF THE LEGISLATURE OF VIRGINIA, AFFECTING THE INTERESTS OF AGRICULTURE.

The General Assembly which adjourned the last month has done *something* for the promotion of agricultural interests—not much it is true—but let us be thankful for even small favors, as they exhibit a mark-

ed departure from the previous regardless and denying course of our state government (the only government to which we look for aid, or acknowledge as having the right to act—) in every thing relating to this great interest of Virginia. These acts, therefore, deserve especial notice, not only for their actual worth, but as indications of greater benefits and more enlightened and equitable treatment, to be expected hereafter.

Three several acts have been passed in conformity with petitions presented, declaring certain navigable rivers and creeks to be lawful enclosures. One is for Willis' River, another for the Upper James River, and the third conforms fully to the petition published in this work at page 450, Vol. II. which asked that the navigable tide-waters of James River and its tributaries should be deemed lawful enclosures. This act will be published hereafter. Another most important boon to the landed interests, and to science, has been granted in the act authorizing the commencement of a geological survey of Virginia, which, with the report on which it is founded, have been inserted in this No. The full and interesting statements of that report leave nothing to be said of the advantages to agriculture and to the commonwealth, that may be expected from the fulfilment of its object. We will dismiss the subject, with merely congratulating our readers on the adoption of a measure which has been strongly urged in this journal from its commencement—and with the expression of the hope that the execution of the work may be committed to one who is worthy of the charge.

The three acts making certain rivers lawful enclosures, are highly important in themselves, as affording extensive relief from the operation of our abominable general law of enclosures—and still more so, as steps, advancing slowly but surely, to the general adoption of the same system of justice and good policy. Zealous as we are, and long have been, for the overthrow of the present law of enclosures, we are free to admit that this mode of reaching that end, in connexion with enlightening the public mind on the subject, is better than a sudden and entire change of policy, before the proper change of opinion, and removal of prejudice, are produced. With these views, we cannot object (at this time) to the conclusion to which the Committee of Agriculture and Manufactures arrived, (and which was sustained by the legislature,) in recommending the rejection of the petition for a change of the general law of enclosures. But at the same time, we must protest against the miserable and false reasoning by which they reached that conclusion, and which is worthy only of court-yard and grog-pen demagogues, addressing themselves to the ignorance of those whom they flatter, despise, and betray. This report will be presented below entire. A "committee of agriculture" that deserved to be so named, would be of the most important use—and the members who composed it would have an opportunity of rendering the most distinguished services to agriculture, and their country. But if this committee, in the six or eight years of its existence, has ever done its country or agriculture the least good, or has drawn to its members the least honor, we have yet to learn the facts.

REPORT OF THE COMMITTEE OF AGRICULTURE AND MANUFACTURES ON THE PETITIONS FOR A CHANGE OF THE GENERAL LAW OF ENCLOSURES.

The Committee of Agriculture and Manufactures, to whom were referred sundry petitions from the counties of Cumberland, Goochland, Prince George, Caroline, Essex, Nansemond, Stafford and Spottsylvania, praying an alteration in the law relating to enclosures, after having attentively considered the same, are induced to believe that the circumstances and condition of various parts of the state are so different, that no change could be made in the general law, which would not operate unequally, and injuriously to some; that in the west, there are many large bodies of waste and unappropriated land, which afford valuable pasturage to the inhabitants of the adjacent country, who would be deprived of this advantage were they compelled to confine their stock within their own pastures; that in the eastern and more cultivated parts of the state, many poor persons have derived advantage from grazing their small stock on the commons and unenclosed lands, and to whom the obligation to confine them, or a liability to damages if not confined, would operate as a great hardship. There are, no doubt, neighborhoods, in regard to which, it might be desirable to change the present laws; but such circumstances seem to your committee too much circumscribed to justify a local legislation extending to the limits of an entire county:

Resolved therefore, as the opinion of this committee, That the aforesaid petitions be rejected.

For the Farmers' Register.

MARL IN CHARLOTTE COUNTY, VA.

The following is a brief description of a very singular argillaceous limestone, as it appears to be, which I lately discovered thrown out of a ditch at the margin of the low grounds, in attempting to convey water to a meadow.

The stones (which appear to have very little grit or sand in them,) have, the most of them, the appearance of races of ginger, or like lead poured out on the earth, by which it is made rough and full of holes; or rather the surface of these stones have the appearance of a petrified wasp's nest (like what is called the honeycomb rock.) They are of various sizes, (some of which are round) from the size of a hen's egg or a walnut, to a pea. More than half of the earth or clay thrown out in which they are imbedded, and with which they have no communication, appears to be composed of these stones. They have the appearance of old plastering, thrown out on the ground where they lie, the color of lime mortar when wet, but a great deal whiter when dry. With a knife they cut very much like slate, and the cut is of a very whitish appearance—more so than the other part of the stone. The atmosphere has little effect upon them, where they are on the bank, only to bleach them, when they have the appearance of bones scattered on the ground. The indications are a large round ferruginous rock, found at the bottom of the ditch, with many smaller ones on the surface. A very rich blue clay is found under this bed of calcareous stones, which effervesces with acid. The earth also effervesces in which the stones are imbedded.

As to the properties of the above mentioned

substance, it appears to possess all those of lime. It effervesces violently with vinegar and nitric acid. Before it is burnt, it is insipid, inodorous and permanent—when calcined to a red heat, it becomes as white as lime—becomes lighter—and when pounded and mixed with water, it makes as strong lime water as lime itself. When thrown into the water after calcination, it produces a hissing noise and heat, as lime does. After calcination it is rather of a greenish white, and is of a strong pungent taste and odor. If properly calcined, I have no doubt it would make very good lime. As yet I have made very little experiment in the way of digging, and none in the application of these stones or the clay, on the bed of sand. The stone is very easily ground as fine as flour, from which any one could scarcely discover the difference, either in the appearance (for it is very white when ground) or in the feeling.

N. E. READ.

ON EDITORIAL COMMENTS.

We have understood that an erroneous construction has been placed on the circumstance of editorial remarks being attached to communications, or not—and that, independent of what the words may convey, the mere accompaniment of any editorial remark is considered as a compliment to the writer, which of course is withheld from others on whom no comments are made. We should not think this most mistaken opinion worth correcting, but for fear of its possibly extending to some persons who may consider themselves overlooked in a distribution compliments, which we had no idea of presuming to offer. We desire that our remarks may be construed according to their expressions only. So far from being called forth merely to express approbation, they have been more generally produced by some inquiry, or some difference of opinion, or some objection to the writer's views: sometimes to ask attention to what was novel and contrary to general opinion, and sometimes to carry out the argument, left incomplete, or to introduce other views suggested by what had been stated. In short, upon any ground calling for remarks, they have been made—but very rarely if ever, to convey, either directly or indirectly, mere approbation of a valuable communication. On the contrary, it has happened upon many occasions, that some of those which we would rank among the most valuable in this work, have been inserted without a word of comment, because none was needed. The foregoing pages of this number, present several illustrations of our thus acting on the ground of the old adage, that "good wine needs no bush"—and every attentive reader can easily call to mind many similar and earlier examples: and every judicious reader will concur in our opinion, that it would be as improper, as it would be presuming, for us to make known our comparative estimate of the value of communications—and as improper in others, to make for our use an imaginary and false standard, which we protest against using, or that any should pay respect to. Of all, therefore, who have fallen into this mistake, we request that every trace of such impressions may be dismissed from their minds.

THE FARMERS' REGISTER.

VOL. II.

MAY, 1835.

No. 12.

EDMUND RUFFIN, EDITOR AND PROPRIETOR.

THE CONNEXION OF AGRICULTURE WITH OTHER SCIENCES, AND REMARKS ON SOILS AND MANURES.

To the Editor of the Farmers' Register.

The dependence of every thing connected with human existence on agriculture, has often been remarked. That she, in her turn, should receive aid from almost every other science and art, displays beauty and harmony in the economy of nature. In this state of things, it were idle to contend with the enemies of book-farming. Knowledge, valuable to any man, is so also to the farmer. Degraded indeed would be the art, if it could gather light from no source but itself. But when philosophically drawing contributions from all quarters, and applying them to its own purposes, it shines in its full glory.

It has long been thought that the beneficent creator had probably supplied every arable part of the world with the means of fertility. Whether this be literally true or not, we find that discoveries are continually making, calculated to produce fertility in the earth. The benefits arising from the application of calcareous manures in England and Scotland are utterly incalculable. The accounts of wonderful fertility produced in the originally barren sands in some parts of the Netherlands, chiefly by means of Dutch ashes, almost transcend belief. In our own country, we have reason to hope, that the tide-water districts will soon undergo a signal renovation by the application of shell-marl. Shall we, in the central districts, submit to the belief, that these aids are denied to us, and that we must rely alone on the evanescent benefits of putrescent manures? Or shall we court the aid of mineralogy in our own region, and search for treasures in the bosom of the earth to enrich its surface? It is certain that there is but little limestone between tide-water and the mountains. Yet it is believed that this has not been sought with sufficient diligence. We must then look to other mineralogical objects, containing lime or some other fertilizing ingredients. Knowing scarcely any thing of mineralogy, I approach this subject with great diffidence, and only because none better qualified will undertake it.

The district in question is perhaps as variable in soil as any whatever. While I would not admit, that in all cases, the surface of the earth receives its character from what is called *detritus*—that is, from the materials of the substratum decomposed, yet probably this is generally the case in primitive formations. In travelling from tide-water to the mountains, we cross innumerable veins of land, differing widely in texture and quality from each other, however contiguous. On examination, these stripes of land are found to contain small particles and fragments of the rocks forming their substrata—and close observation leads to the conclusion, that the character of the soil depends much on the materials of which these rocks are composed. Some of these veins have considerable breadth, and in length extend through many of our coun-

ties, as that excellent range of land passing near Charlottesville and forming one of the finest tracts of country in the state. This range principally rests upon hornblende rock combined with iron in such proportions, as, by the carbonizing of the latter, causes a rapid disintegration of the rock. The peculiar argillaceous loam thus produced, forms earth, which in capacity for improvement to a certain extent, is perhaps not surpassed by any in the world.

There are innumerable other ranges of hornblende in that part of the state lying within sixty or eighty miles of the Blue Ridge. Indeed, in a great part of the country alluded to, a little of this material may be found on almost every farm. There is, however, less iron in it, apparently, and of course, the disintegration is slow, and the rocks generally near the surface. Unlike the hornblende in the grand range first mentioned, which rises even to the mountain-tops, that, in these smaller ranges, is swallowed up in the high ridges, and its out-croppings appear principally in ravines and near the watercourses; so that the ranges have their continuity broken, affording interrupted spots of fertile or improveable land, preserving a course parallel to the mountains.

Wherever this rock is found, its fertilizing properties are displayed in the soil about it. I would ascribe this to its containing lime in greater or less quantities. This has been proved by analysis, and may be inferred from clay-marl being occasionally an accompaniment of hornblende. I saw, some months past, on the land of James Wilson, Esq. of Prince Edward, a bed of marl lying upon this kind of rock—and many marly concretions adhering to the rocks, not only in the bed, but to those on the surface. I have also recently seen on the lands of Colin Stokes, Esq., of Lunenburg, a bed of marl—appearing to the eye, the richest I have ever met with—incumbent on a very extensive bed of soft stratified hornblende. That a rock enriching its environs by disintegration, and forming marl by decomposition, would, if broken by art, improve the character of the soil on which it might be spread, cannot be doubted. But, we are assured by Professor Eaton that it has been found by experiment to possess this property. (See Farmers' Register vol. I. No. 4, p. 248.) Although this substance should not be spread as manure, after pounding or otherwise comminuting, its existence in a soil is well worth observing, as it indicates such to be the very soil for improving more, especially by means of clover and plaster.

I have frequently observed gravelly hills, such as while in woods are covered chiefly with post-oak and hickory, to be remarkably free land, particularly in the growth of tobacco. Much of the gravel is found on examination to be feldspar, having smooth reflecting surfaces, often inclined to a flesh color. The soil looks thin, and I never could account for its fertility, until I learned that feldspar contained both lime and potash. The latter ingredient sometimes rises as high as fourteen per cent. Potash being deliquescent, would run off with the water, as fast as the gravel de-

composes, unless means are used to fix it, by combination with other manures. Every one acquainted with such land, knows how kindly it improves when properly aided.

There is a body of clay land about Buckingham Court House of great value, and particularly famous for the production of wheat. This soil seems to owe much for its vigor of constitution to the large proportion of argillite, or clay slate, which enters into its composition. There is also a happy admixture of hornblende in this soil, as is evinced, by the quantity of dark green or black sand observable in it. These lands are generally in the hands of those, who know their value, and what to do with them; and a continued improvement is confidently expected. This, most probably, with the river bottom, will eventually form the best *gold regions* in that county. After some interruption by the high ridges, the same range (as the writer believes) crosses the Appomattox in the neighborhood of Trent's mill and Patterson's tavern. Here, however, there is a much larger proportion of fine black sand. May not what are called the Green Spring lands in Louisa, belong also to the same range?

The lands between Cumberland Court House and the Appomattox, commonly called the Guinea lands, have often been admired as a remarkably fine specimen of sandy loam. This body of land seems to belong to the same range, with that on Bush and Sandy rivers in Prince Edward, and to possess about the same characteristics. In its virgin state, it could scarcely be surpassed in its free and kindly qualities. The quantity of sand contained, makes it, of course, easy to wash; and the culture of corn, oats, and tobacco—the two first great exhausters, and the last almost the entire monopolist of manure—has reduced much of it to poverty. This range of land, whenever it becomes the subject of meliorating treatment, must make most grateful returns, and display fertility rarely seen. Its improvement has, in many instances, been judiciously attempted, with the promise of abundant reward. The peculiar adaptation of this range to the crops above mentioned, and its unsuitableness to the best growth of wheat, operate—under the miserable state of our avenues to market—as discouragements to its improvement. It is founded on slaty hornblende and feldspar, and particles and gravels of these may generally be readily found, interspersed through the soil. In some places, these minerals seem to be blended, forming what I consider to be the rock, called by mineralogists, sienite. From the tendency of the substratum to decomposition, the soft light earth lies deep upon the rock, in many places, in others, the rocks may be found near the surface.

Numerous other ranges might be pointed out, but the foregoing may suffice to show, that in our primitive formation, the earth generally is *analluvion*, that is, formed from the decomposition of the rocks below, and that its capacity for improvement depends much upon the constituent principles of these rocks. This being the case, the question might arise, on the propriety of pounding and conveying, for short distances, such rocks as seem to contain substances calculated to increase the capacity of land for improvement. At least the earth, about such rocks, might be removed to weaker lands. On almost every farm, spots may

be found, possessing a constitution superior to the remainder, and affording strong grounds to suspect, that they contain materials, which by their chemical powers might act beneficially on other lands. It is well known, that lime, soda and potash and probably magnesia, are, when properly used, excellent manures; and it is much to be desired, that scientific gentlemen would search out and describe the minerals containing these manures, so that farmers may know how to avail themselves of their benefits.

Chemistry may be expected to contribute more largely to agriculture than any other science. Indeed, it runs, directly or remotely, into almost all that concerns the latter. We will, however, at present notice only its agency in the preparation and application of putrescent manures.

On this subject disputes have been endless. Some, contending that manures should be thoroughly rotted, others, that they should be used in a cruder state; some holding that they should be deeply buried, while others maintain that they should be applied to the surface. Manures supply the food of plants to the earth, and they improve its texture mechanically, preparing it to become a more suitable bed for their roots. The chief concern therefore—as was observed by the writer of one of the most valuable articles in the Register, whose words I cannot now quote—should be, to prepare and apply them in great abundance; and he who does this most diligently, is apt to succeed best. While this is true among us, when we devote very little attention to the subject at all, yet were all equally diligent in this matter, it would be found that he would succeed best who exerted most skill.

Vegetable substances, when thrown into a large mass, go into fermentation, and portions of them become soluble in water. Such portions are then thought to be in the proper state for nourishing plants. If this fermentation be kept up longer, portions of them become (if I may use the expression) soluble in air; that is, they are liable to be converted into gas, and to be lost. And the whole pile, however large, would eventually be evaporated, except an inconsiderable residuum. Various expedients have been resorted to, in order to save these volatile portions, by causing them to be absorbed by light earth or other materials. It is probable, however, that this may be unnecessary, should we ever reduce this most important branch of husbandry to an *art*, with a clear understanding of its theory.

The various operations connected with the business of manuring are most commonly performed rather according to convenience, than directed by judgement. Our corn-stalks, straw, leaves, &c. are drawn together when it best suits us; they lie in the farm-pen or stable-yard, exposed to the weather, until convenience allows, or necessity compels us to drive them out. I apprehend that considerable increase might accrue in the value of our manures, were the materials of which they are made, kept under shelter, until they are sufficiently impregnated with animal matter, to cause a brisk fermentation as soon as they are heaped and artificially watered, or exposed to the weather. The mass then might be equally rotted, and the vast drain of saline and other soluble matters, usually produced by drenching rains, might in a great measure, be prevented. Fermentation goes

on, in such heaps, as well and perhaps with less waste, in cold weather, than in warm. Such heaps might be made once in two weeks, through the winter, and often matters might be so arranged, as to render it a convenience to haul out manure as a return load, while drawing materials for making more into the farm-pen. And this, I think, would be more than a mere convenience, as I hold that the sooner manure is applied to the soil, after it is made, the better. Some expense would arise in erecting suitable shelters, but this would soon be amply repaid in the increase in quantity and quality of the manure, and comfort and consequent improvement of the stock. In a well littered farm-pen, exposed through the winter to the weather, much of the richer parts must rise, even in cold weather, to the gaseous fermentation, and be wasted. The same litter, sheltered, would not ferment, for lack of moisture, during the short time allowed for its impregnation with animal matter. Indeed, it is doubted, whether—should it be necessary—it might not be kept free from fermentation through the whole winter. I think it also certain, that, while not chemically fermenting, its loss would be trivial.

Much has been said, on the subject of applying manure to land, and many directions given about heaping it and carefully covering the piles with earth, to save the escaping gases. After all, I doubt whether it be not best to spread it at once over the surface. While kept in heaps, chemical action must go on. This produces an evolution of gas; and though much of this may be caught by the covering of earth, yet this is taken from the heap below, and leaves it weaker. If, after sufficiently rotting manure at the farm-pen or stable, it be equally spread over the surface, little or no chemical action can occur. It is true, the sun and air speedily dry the water out of it. But this is very different from the chemical fermentation employed in rotting it, while in heaps. After it once gets dry, it can lose no more, not even of moisture; and when it rains, its soluble matters go into the earth, where they ought to be, mouldering and mellowing the clods, and preparing the land to produce a fine crop. Who has not seen—after a rich dressing of manure has been hastily buried under a poor clay—the clods remaining obdurate, with great detriment to the crop, throughout the season? And who has not seen a summer cow-pen, which has not been ploughed till the next spring, surpass in crop, an adjoining one, which was well turned over in the fall? This experiment, I have repeatedly made; and have fancied that the advantage gained, was protracted beyond the first year, by the kindly condition in which this treatment left the soil—especially, when the land has been in a short time, laid down in grass. But, even if the benefit lasted but for one year,

* The attention of the writer was drawn to the subject of surface manuring, many years ago, by something written by one of the venerated compeers of Col. Taylor. Since writing the article above, I have received my March number of the Register, and find, if I may judge from the initials, and from the well known cheery style—something on the same subject from the same hand. May the periodical numbers of the work long be enlivened by the effusions of this writer, who has devoted so much of his life, to the service of his country!

the speedy return from such an investment of manure, would be worth considering. It is, however, granted that no harm can result from a deep burial of manure, in a loam sufficiently rich and mellow to nourish the young plants, until their roots can strike down to it. But, even here, it might be doubted, whether benefit might not be derived from exposing the manure to one or two rains before ploughing it in. Some of the best practical farmers in Virginia have adopted the plan of top-dressing, not only with prepared manures, but also with fresh straw—the soluble portions of which are readily yielded to water. And the practice may reasonably be defended, until it can be demonstrated, that the sun and air exert a material chemical action on a thin stratum of manure.

A proposition in agriculture, has been too fully demonstrated, to need an attempt at confirmation here, which the improving farmer should always bear in mind. It is this*—that a soil cannot, by the best rotation of crops, aided only by the use of putrescent manures, be permanently kept at a grade of fertility above its natural standard, or that which it held before clearing—or, in other words, that every soil has its natural grade, as regards its capacity for improvement, and that this grade depends upon its approach to that happy combination of sand, clay, and lime,† which constitutes the perfection of a soil. An attention to this doctrine will lead us to apply putrescent manures largely, only to those soils which seem to have a large capacity for retaining them, while we endeavor to keep the weaker soils up to their standard of fertility, by a mild rotation, and occasional meliorating crops; using diligently whatever opportunity may offer itself, for elevating their grade, by the use of permanent manures.

The foregoing remarks are offered, with a sincere conviction of the importance of the subjects, and with the hope that more experience, talent, and science may be brought to bear upon them.

M. N.

STATEMENTS OF THE CONSTITUENT PARTS OF SOILS OF THE PRAIRIES OF ALABAMA.

To N. Herbemont, Esq.

Columbia, March 10, 1835.

Dear Sir,—I have read in the Farmers' Register at pages 277 and 367 of Vol. I. the articles on the prairies of Alabama, extracted from the Southern Agriculturist, and in them recognize the hand of a valued friend, whose intelligence and experience impart more than ordinary value to his opinions. As I know you are in correspondence with the editor, to whom I am unknown, I will supply you with a few facts in relation to the soil of this interesting region, which, if you deem them worth preserving, you may transmit to him.

The description of the surface, soils, and ap-

* See "Essay on Calcareous Manures." The book being lent out, I cannot quote verbatim.

† That lime exists, in every soil capable of production, either in a combined or free state, has been fully proved. It is believed, however, that those soils containing a little lime in a free state, and ready for combination with putrescent manures, are best.

pearance of that region, given in the articles referred to, over the signature of "A Planter," is complete; the facts I will now furnish relate to the analyses of some of the varieties of soils. The analyses were made by Drs. Cooper, Nott, and Gibbs. The notes furnished me are not very complete.

The first was a sample of the bald prairie, from the plantation of Col. Deas, lying on Big Swamp, Lowndes county. It is not known at what precise depth it was taken. It contained twenty-five per cent. of carbonate of lime—twenty-eight of vegetable matter: the balance not stated in the paper lying before me.

The second, was from the same plantation, and a sample of blue prairie. It contained fifteen per cent. of carbonate of lime—twenty-five of vegetable matter—the rest aluminous earth and a small quantity of siliceous and iron.

The two next samples were from the plantation of Elmore and Taylor, on Pintala Creek, Montgomery county, taken from the open prairie. It was taken up with great care, the earth being first removed to the depth of six inches, and a sample then taken up; the earth was then removed to eighteen inches depth and a second sample taken up, and both carefully wrapped up and labelled on the spot. The analysis resulted as follows:

The first, taken six inches below the surface, yielded carbonate of lime, thirty-eight per cent.—vegetable matter twenty per cent.—siliceous, alumina, oxide of iron forty-two per cent.

The second specimen, taken at the same spot and eighteen inches below the surface, yielded carbonate of lime forty-eight per cent.—vegetable matter twenty-nine per cent.—siliceous, alumina, oxide of iron, &c. twenty-three per cent.

The two last developing a fact most remarkable, an increase of vegetable matter as the ground is penetrated.

I will only add one other fact, leaving it to others to explain the cause. On the same plantation, there is in one of the fields, one of those bald prairie hills, where the soil is nearly white. It has now borne its seventh crop of corn, being unfit for cotton. When first planted, it scarcely produced seed—but every subsequent year its product rapidly increased, without manuring, till its crops have been some years estimated at forty bushels of corn to the acre. The last two years, a few cotton seed have been thrown into the hills, with manifest advantage. I have seen one other field of the like kind, where the result has been precisely alike. When I saw it three years ago the crop was estimated at forty to fifty bushels of corn.

The soil in these two fields is very similar to that analyzed in the two last experiments, the difference being something in color, that analyzed being a few shades darker. The only apparent cause for the increased fertility of these soils, under cultivation without manure, is the action of the air upon the earths, and the small addition of vegetable matter from the corn-stalks and grass.

I will, in conclusion, state that it is very probable that I may receive specimens of more varieties of these soils in the course of this spring, and if I do, they will be given up for a like examination.

E. ———.

[To the foregoing very interesting statement (in which there is nothing wanting except the greater au-

thority which the writer's name would have given,) we will add some similar facts obtained from partial analyses, (limited to ascertaining the proportions of calcareous matter only,) of other prairie soils. It was with the view of prosecuting these examinations that we have more than once asked for specimens of prairie soils—and we are much gratified to have here the results obtained by others, of much higher credit and authority in chemical investigations. We have been the more forcibly impressed by the highly calcareous nature of the prairie soils, so far as we have been enabled to know any thing of their composition, from having before ascertained the still more remarkable fact, that (so far as examined) almost all the lands now, or formerly, covered with wood, and even alluvial lands, contain not an atom of carbonate of lime. This we are sure of as to Virginia, and have as yet found no difference in the soils of other states. It may be that the quantity of lime in the prairie soils is the primary cause of the strange absence of trees—that to the same cause may be attributed the like peculiarities of the vast *steppes* of Tartary and Russia, and the *Pampas* of South America—and that to the more general diffusion of calcareous earth in European soils, is attributable the general difficulty found there of raising trees, the growth of which in our part of America, can with difficulty be destroyed, and is renewed as soon as the labor of man is merely withdrawn. We invite others to aid in investigating this subject, and to show whether these are baseless speculations, or suggestions of some value. Before this cause of the formation of prairies occurred to us, there appeared no rational means for explaining the strange facts connected with them. Most persons are satisfied to attribute their formation to the annual fires made by the Indians. These fires are doubtless the immediate agents of the destruction of growing trees—but could not have had that effect unless the soil was far more favorable to the growth of rank grass than of trees, so as to furnish abundant fuel for the destruction of the latter. Fires were as frequent on the Atlantic coast, without producing a single prairie. But this is wandering too far, until more facts are furnished. The few of like kind which follow, are extracted from the second edition (now in the press) of the *Essay on Calcareous Manures*.]

The only soils of considerable extent of surface which, from the specimens that I have examined, appear to be highly calcareous, and to agree in that respect, with many European soils, are from the *prairies*, those lands of the west which, whether rich or poor, are remarkable for being destitute of trees, and covered with grass, so as to form natural meadows. The examinations were made but recently, (in 1834) and are reported because presenting striking exceptions to the general constitution of soils in this country.

20. Prairie soil of the most productive kind in Alabama, is a black clay, with very little sand, yet so far from being stiff, that it becomes too light by cultivation. This kind of land is stated by the friend to whom I am indebted for the specimens, to "produce corn and oats most luxuriantly—and also cotton for two or three years; but after that time cotton is subject to the rust, probably from the then open state of the soil, which by cultivation

has by that time become as light and as soft as a bank of ashes." One hundred grains of the specimen contained eight of carbonate of lime. All this prairie land in Alabama lies on a substratum of what is there called "rotten limestone," (specimens of which contained seventy-two to eighty-two per cent. of lime,) and which rises to the surface sometimes, forming the "bald prairies," a sample of the soil of which (21) contained fifty-nine per cent. of carbonate of lime. This was described as "comparatively poor—neither trees nor bushes grow there, and only grass and weeds before cultivation—corn does not grow well—small grain better—and cotton soon becomes subject to the rust." The excessive proportion of calcareous earth is evidently the cause of its barrenness.

The substratum called limestone is soft enough to be cut easily and smoothly with a knife, and some of it is in appearance and texture more like the chalk of Europe, than any other earth that I have seen in this country.

22. A specimen of the very rich "cane brake" lands of Marengo County, Alabama, contained sixteen per cent. of carbonate of lime. This is a kind of prairie, of a wetter nature, from the winter rains not being able to run off from the level surface, nor to sink through the tenacious clay soil, and the solid stratum of limestone below.

23. A specimen from the very extensive "Choctaw Prairie" in Mississippi, of celebrated fertility, yielded thirteen per cent. of carbonate of lime.

From the [British] Quarterly Journal of Agriculture.

ON THE MAKING OF BUTTER AND CHEESE
IN THE DAIRY DISTRICT OF SCOTLAND.

By MR. WILLIAM AITON, Hamilton.

On making Butter.

Milk, as it comes from the cow, is composed of three substances, viz., an oily or butyaceous matter, a lactic or caseous substance, and serum or whey, all in mechanical mixture; and these are separated by the operations of the dairy, and each of them converted to its proper use as human food. It is the oily part only that can be formed into butter; and that is done by churning or agitation, either of the whole mass of the milk, or of the cream only. As the preparation for churning is different in these, it becomes necessary to describe both, so as any person in the least acquainted with the qualities or management of milk, may understand how to extract the butter it contains, by the one process or the other as may best suit his purpose.

Milk may be churned, and the butyaceous matter in it collected, whenever it is drawn from the cows; but, as that oily matter does not separate from the lactic matter and serum until the mass has become sour, it is much better to allow the milk to acidify naturally before it is churned, than to force it into that state by protracted agitation in the churn. For when butter is forced from sweet-milk, the churning has to be continued till it becomes sour, by the absorption of oxygen, during the course of churning, and in that case the butter is always very soft. But when the milk has acidified naturally, before it is churned, that operation is as speedily and easily performed on the whole mass of milk, as when the cream has

been separated from the milk and churned by itself.

Formerly milk and cream were thrown together as they came to hand, and either sweet or sour as they happened to be, and the whole stood over till it was convenient to churn the mass; and that slovenly way of management is still practised by many farmers. But wherever sweet-milk and sour-milk are mixed, the former is forced into premature acidity, and the conglum of the latter being broken, the whole mass becomes fermented, throws off its serum, soon becomes rancid, and communicates that taste to the butter; while the butter-milk continues in a state of fermentation, and does not again unite with the serum, but forms itself into curds and whey, having a rancid, musty flavor and taste.

Fortunately a great improvement has been effected in the important process of making butter and butter-milk far more palatable and wholesome than was practicable by the ill conducted operations which have been described. And as it has been often termed the "Mearns" plan of making butter and sour milk, it is probable it had its origin in that parish, where these articles of food have long been manufactured to a great extent for the Glasgow market. Be that as it may, the mode of making butter and sour milk, all over the dairy district of Scotland, is nearly the following:—

The milk, when drawn from the cow, is placed from six to twelve hours in coolers, the same as when set aside to cast up its cream, but this is merely to let the milk cool. And whenever it is completely divested of its natural heat, the whole meal of milk is emptied from the coolers into a stand-vat or tub sufficient to contain the whole. If the vat is large, and a second meal of milk has become cold before the former meal has begun to acidify, the second may be turned into the same vat with the first. But if the first has in the least become sour, or is found to be approaching to acidity, the second meal of milk is placed into another vat by itself, to prevent its being soured otherwise than in its own natural course. A lid or cover is thrown over the vat which contains the milk, and it is allowed to stand undisturbed till the milk has not only acidified, but till it has been formed into a coagulum, (or "lapper" in dairy language.) Whenever it comes to that state, it is ready to be churned, but it can be allowed to stand over till as much is ready as may be convenient to churn at the same time, and the milk is no way injured by remaining in coagulum for several days, provided that it is not disturbed, or the lapper broken; but if that is done before churning can be commenced, the serum separates from the caseous and oily parts, and the whole mass ferments.

When the churning is commenced, the milk that has not soured and coagulated is not churned. If any milk not fully lapped were to be churned with the other, the butter would not be hurt by that milk, but the butter-milk would become fermented, run into curds and whey, and soon acquire a rancid taste and smell. But when the whole milk has lapped before churning is begun, and where every thing is rightly conducted, the sour-milk, if kept in a cool place, and in clean dishes, will have a mild and pleasant acid taste, and the lactic parts will not separate from the se-

rum for a good many days after churning; and the butter manufactured in that manner will be found to be every way as good as that made from cream alone, or in any other way whatever. If the cream has been several days in collecting, and been allowed to throw off its serum, or stand long exposed to the atmosphere, before it is churned, the butter from it, however oily, will not have such a fine taste as that made from the whole milk managed in the way herein pointed out.

Milk prepared in this manner is churned in upright or plunge churns, of a size to suit the magnitude of the dairy. Where only a few cows are kept, the churns will contain about fifty Scots pints (100 quarts,) but, in larger dairies, they generally contain from 100 to 120 Scots pints, and some still larger. These large churns are, on some farms, moved by machinery, of various construction; but, in the greatest number of dairy farms, churns of 100 pints, or more, are wrought by hand labor only, and frequently by the female servants. After the clotted milk has been put into the churn, and agitated for a few minutes, merely to break the coagulum of the milk, as much hot water is poured among the milk as to raise it from 50° or 55°, the temperature of the milk-house, to 70° or 75° of Fahrenheit's scale; one person agitating the milk, while another throws in the water. The temperature of milk must be raised to or above 70°, before the butter can be separated from the milk; and the temperature of milk cannot be so well raised in any other way as by pouring in boiling water among it, when it is begun to be churned. And in this and many other operations of the dairy, every thing regarding temperature should be carefully regulated by the thermometer. This valuable instrument, however, is seldom used in the Scotch dairies, the degree of heat being guessed at from the appearance of the milk. If the milk is too cold when churning, it swells, has a pale white color, throws up to the surface many air-bubbles, and emits a rattling noise. But when the milk is in proper heat, it does not swell, it has a straw or cream color, has a softer sound when agitated, and does not throw up bubbles very plentifully. These appearances no doubt assist the experienced dairy people in regulating the heat of milk under the operation of churning; but surely the thermometer would be a much better guide: for, when milk is either overheated at the time it is churned, or when that operation is too hastily performed, the butter is soft, and of a white color. When the heat of the milk is at the proper height, from 2½ to 2¾ hours is the proper time for churning. When milk is of ordinary quality, eight Scots pints (or 24 pints imperial) yield 24 ounces of butter; and, from the water necessarily thrown in at the time of churning, the quantity of butter-milk is equal to the milk churned.

The late Arthur Young has said, that butter-milk is only fit to be consumed by swine; and Dr. Dickson seems inclined to devote skim-milk, butter-milk, and whey, to the feeding of pigs; but the laboring people in Scotland and Ireland use vast quantities of these as food to themselves and their children, and are happy to get them at a penny per Scotch pint, or two quarts.

Another method of making butter, and one most frequently followed, is to separate the cream from the milk and serum, as completely as possi-

ble, and to churn the cream by itself. When this method is followed, the milk, when drawn from the cow, is placed about three inches deep in coolers of wood, or of iron tinned in the inside, or of stoneware; and it is allowed to stand in the milk-house, at a temperature of 50° or 55°, till the cream rises to the surface. In the dairies where the milk is formed into butter and skim-milk cheese, the milk is generally allowed to remain in the coolers from 36 to 48 hours, in order to obtain the whole cream. In Holland, the milk is not allowed to stand in the coolers more than from 16 to 24 hours, which is one of the reasons of the Dutch butter being of superior quality to ours. The first cream that rises to the surface is always richer, and yields better butter than that which is longer in coming to the surface. On this account, some who want butter of the first quality, take off the cream at six hours' standing, and skim the milk a second time for butter of inferior quality. If the milk stand in the coolers from 24 to 30 hours, the butter will be better than when it stands 48 hours; because the cream that rises after 24 hours, is of inferior quality, and the milk and cream, when too long exposed to the air, are greatly injured.

The cream is taken off the milk, either with a skim-dish, or by pouring it carefully over the lip of the stand-vats or coolers. And it is placed in a vat till as much is collected as may be convenient to churn together. The cream in that state soon acidifies, and the oily matter, with some portion of the milk in the cream, are formed into a clotted state over the serum; if it remains long unchurned fermentation commences, mouldiness soon covers the surface, and the whole mass acquires a rancid taste. To prevent these evils, the cream ought to be well stirred twice every twenty-four hours, with a stick, from the time it is skimmed off the milk till it is churned.

Cream thus separated from milk, is an oily substance. When taken off the milk, it contains a portion of milk, which is separated by percussion or churning. When new, cream forms a rich and delicate food, either by itself or under various modes of cookery; but its most common use is in the shape of butter.

Cream is churned in vessels of various forms and dimensions, as upstanding plunge-churns, barrel-churns turned round with a handle, and patent box-churns. But whatever their form be, or the power by which they are worked, the effect is to break and shake the cream, till the oily part of the mass be separated from the milk, and formed into butter. The cream must be raised to 70° or 75°.

Churning of cream should be neither too hurriedly nor too slowly performed. Two hours is the shortest period in which it can be done with safety, but it need not be protracted longer than two hours and a half; and the operation should be carried on steadily, from its commencement to its termination. When the churning is carried on rashly, or the cream too much heated, either by churning or the admixture of hot water, the butter is too soft and of a white color. If the cream have become rancid, that disagreeable taste and flavor will not be removed by churning, but will extend to the butter and butter-milk.

Whenever the butter is made in the churn, it is removed from the butter-milk, and well washed,

in at least three or four changes of clean spring-water, as cold as it can be found. If the butter is very soft, and the weather hot, it should be allowed to lie for ten minutes or so in the cold water, to harden, before it is much beaten. But when that is done, or when the butter is not too soft, it must be carefully kneaded with a skimming-dish or the hand among the changes of water, till every particle of the butter-milk is expelled; after which, and while the butter is still soft, that part of it which is not to be immediately used ought to be salted, the salt minutely mixed, and the butter carefully packed into vessels or casks, that are air or water tight, and every crevice filled with strong pickle, to exclude air.

The quantity of salt for butter that is not to be eaten for several months after salting, should not be less than half an ounce, mixed with two drachms of sugar and two drachms of nitre, to sixteen ounces of butter. The sugar improves the taste, and the nitre gives the butter a better color, while both of them act with the salt in preserving the butter from rancidity. If the salt is not minutely mixed into the butter, that on which it rests will have a yellow or brownish color, while the rest will be of a white color, which, in dairy language, is termed "pyety butter," that brings an inferior price. But although the butter has to be kneaded among the water, and the salt well mixed into it, care must be taken not to bake or knead it too much, otherwise it will become tough and gluey.

As butter, in its purest state, still contains a portion of the milk and serum from which it is extracted, it should not be much exposed to the air, from which it soon attains a rancid taste; that, however, may be partially removed, by kneading in pure water, mixed with a portion of alcohol, but never entirely remedied. In the county of Aberdeen, butter is formed into a lump, without being salted, and remains exposed to the atmosphere for a week or longer, till the merchant send round his cart, to collect what he can find in the district; and when convenient, some time after, the whole butter so collected, is trodden with bare feet into one mass, the salt mixed into it, and then packed into firkins. This seems to be a very slovenly way of managing butter, and when treated in that way, it cannot fail to acquire a rancid taste.

When butter is made from rich well-flavored milk or cream, and every thing about the manufacturing of it properly managed, it has little smell, a mild agreeable taste, and forms a pleasant and wholesome food. When completely divested of impurities, it possesses the properties of oil. Butter begins to melt at the temperature of 96°, when the pure oil floats over the remains of milk or other impurities; and this process of purification requires to be done before it can be carried to a hot climate.

The qualities and flavor of butter are influenced by the cattle from which the milk is drawn, still more by the food which they eat, and, most of all, by the manner in which the butter is manufactured. Some breeds of cattle, and individual cows of every breed, give richer milk than others. Cows that are too young, or too old, and those that are unhealthy, or lean, never yield good milk. When fed on old pasture, or when they are fed on grain or green food during winter, they give richer milk, and more copiously after calving, than

when stinted in their food. When fed on turnips, cabbages, clover, and sown grasses, the cows, if in good habit, give copious draughts of milk; but the butter made from them is not of so good a quality, as when they are fed on old though inferior pasture.

The history of making butter in ancient times is but imperfectly known. Butter is no doubt mentioned in Scripture; and, in one place, it is said to be brought forth by "churning of milk." But Professor Beckmann and others say, that the Hebrew word translated "*butter*," should have been rendered *milk or cream*. And surely the bringing "forth butter in a lordly dish," cannot be well made to apply to what we now give that name. From butter not being mentioned by any of the ancient Greek poets, it may be supposed that it was not known to that wise and brave people. The ancient Romans knew nothing of butter, till they were taught by the Germans how to make it; and it was not used as food by the Romans, but merely as oil. Herodotus says, that the Scythians formed butter, by shaking or agitating mare's milk; and the poet Anaxandrides says the Thracians ate butter, at which the Greeks were surprised. Dioscorides says that good butter was prepared from the fattest milk of sheep and goats, by shaking the milk in a vessel, or, more probably, in a leathern bag. And Galen says, the fattest butter was obtained from the milk of cows. When Julius Cæsar invaded England, he found that the inhabitants had abundance of milk, from which they made butter, but could not make cheese, till they were taught that art by their invaders. From that period butter and cheese have been made in Britain; though, till lately, in a slovenly manner.

On making Cheese.

Cheese is formed chiefly from the caseous portion of milk, either with or without the cream.

Cheese and the curdling of milk are mentioned in the book of Job. Homer mentions cheese as forming part of the ample stores found by Ulysses in the cave of the Cyclop Polyphemus. David was sent by his father Jesse to carry ten cheeses to the camp, and to look how his brethren fared. "Cheese of kine" formed part of the supplies of David's army at Mahanaim, during the rebellion of Absalom. Euripides, Theocritus, and others of the early poets, mention cheese. Ludolphus says that excellent cheese and butter were made by the ancient Ethiopians; and Strabo says, (lib. iv. p. 200,) "some of the ancient Britons were so ignorant, that though they had abundance of milk, they did not understand the art of making cheese." It must appear strange, that a people so active as the ancient Romans, though able to instruct our ancestors to make cheese, did not know how to make or use butter. There is no evidence, however, that any of these ancient nations had discovered the use of rennet in making cheese, but seem merely to have allowed the milk to sour, and to have formed their cheeses from the caseous part of the milk, after expelling the serum. As David, when too young to carry arms, was able "to run to the camp" with ten cheeses, ten loaves, and an ephah of parched corn, the cheeses must have been of very small weight.

It is not known, or likely ever to be discovered, when or by whom the use of rennet in coagulating milk was discovered. It does not appear that any material improvement in making cheese had been made in Scotland after the use of rennet was known, until about the middle of last century, when full-milk, or Dunlop cheese, began to be made in the Bailliary of Cunningham, in the county of Ayr. But by whom that cheese was first made has not been discovered. The Rev. Mr. Brisbane, minister of Dunlop, has introduced a traditionary story into his account of that parish, of a woman of the name of Gilmour having been taught in Ireland, whither she had fled during the persecutions before the revolution in 1688; and on her return to Scotland, introduced that art into her native parish. If it could be shown that any such cheese was then made in Ireland, the story would be more worthy of credit. It is not certain that the name "Dunlop cheese" proceeds from the parish, or from a dealer in cheese from the parish of Stewarton, whose name was Dunlop. Be that as it may, that species of cheese was begun to be made by some farmers in the Bailliary of Cunningham, prior to the middle of last century; and it has gradually extended over the counties of Ayr, Renfrew, and Lanark, and in Galloway. It is not inferior in my opinion to the best cheese that is made in England or in Holland, and its character continues to gain estimation.

Wherever as many milch cows are kept upon one farm, as their collected milk will form a cheese of a tolerable size, every time the cows are milked, twice in the twenty-four hours, the milk is passed through a sieve, to remove impurities, such as hairs, and collected into a tub of a size to contain the whole milkings. The rennet is then mixed with the milk, and a cloth thrown over the tub till the milk coagulates, which generally happens in ten or fifteen minutes. But as milk should be coagulated at nearly animal heat, and as it must have cooled considerably in milking, passing through the sieve, and pouring into the tub, it might be proper to throw in a small quantity of hot water, to make up the heat that has been lost before the curd is formed. This is done in some dairies, particularly when the weather is cold.

When the cows on any farm are not so numerous as to yield milk sufficient to make two cheeses every day, the milk drawn at night is placed in coolers in the milk-house till next morning, when as much of it is heated as brings the whole, with that of the morning's milking, to the proper temperature for being coagulated; and the two milkings are formed into one cheese. In some of the English dairies, the cream taken off the cold milk is heated so as to make the whole sufficiently warm for being formed into curd; but in the Scots dairies the cream is taken off the milk, and the skim-milk only heated, so as to bring the mass into a proper temperature. Either way may do, but I am partial to the Scotch method, because when the cream is heated, the butyraceous matter in it must be melted into oil; after which I would be afraid the oily particles would more readily go away with the whey than when the cream had never been melted. I know that the English dairy people say, that the fat that goes off with the whey is recovered in the shape of whey-butter; but I consider the butter collected from whey as a species of fraud, committed either intention-

ally for gain, or more commonly the result of ignorance, and slovenly and unskilful practice. When milk is coagulated at the proper temperature, the curd sparingly broken, and the whey taken off with as little squeezing as possible, the whey resembles sea water, and contains no part of the butyraceous matter that would be possible to collect. It is only when the milk is overheated, or too much broken and squeezed, that butter worth collecting is ever found in the whey.

After the greatest part of the whey has been removed by gentle means without bruising the curd, but cutting and turning it up softly, and when the curd has been brought to the consistency of butter, it is placed in a drainer and cut into pieces about two inches square; a board or lid is then placed over it to compress it with a weight of 40 lbs. or 50 lbs. in order to squeeze out the remains of the whey. As the curd consolidates by this pressure, it is necessary to turn it up twice or thrice, at a quarter of an hour between each turning, and cut the curd as before, and renew the pressure till the whey is expelled. The curd is then cut into small pieces with a knife made for the purpose, and mixed carefully with salt. The salted curd is then placed in the cheese vat, with a piece of thin canvas around it, and subjected to pressure. It is then a cheese. After the cheese has remained under pressure for three hours or so, it is turned out, a dry cloth put round it, and again put under pressure; and this is repeated, twice every twenty-four hours, till the cheese is completely formed. Generally forty-eight hours after it is first put into the press is sufficient for it.

In some of the dairies the cheeses are (after having been once or twice under pressure, and beginning to adhere) put into a hot bath of water for half an hour or so, and being well dried, they are again put under pressure in a dry cheese vat with a dry cloth round them. The intention of the bath is to draw out the whey and accelerate the pressing of the cheese. The water is made as warm as a person can endure the hand in it. This plan, however, has never come into general use, and it is the opinion of some that it has a tendency to soften the cheese too much at the time, and to render it tough afterwards; as every application of hot water to curd has the effect of rendering it tough.

The Scots cheeses are always salted in the curd at the time they are about to be put under pressure, and never in brine, nor by rubbing with dry salt after they come from the press, as is generally done in Holland and Cheshire. Any of these methods of salting may do; but surely the Scottish way is the easiest, and the salt can be given more exactly than in the other methods.

When the cheeses are taken from the press, they are exposed for three or four days to the heat of the kitchen, or some other such place, and turned over twice or thrice every day till they harden a little, and then they are removed to the store-room, and turned every second or third day. In many of the small dairies the cheeses are stored in the barn, on boards laid on the floor. Others place them on the floors of garrets or attic storeys of their dwelling houses. Of these the barn is preferable to the garrets, which are too warm in summer, especially if the house is roofed with slates or tiles, and fire constantly kept in the house. The barn is cool, airy, not too dry, nor

having too much light. But in dairies where the buildings are rightly fitted up, a store-house, having a moderate portion of air, little light, and neither damp nor very dry, should be built near to the dairy-house, and the cheeses placed there on wooden shelves. The sun must not be allowed to shine on the cheeses in the store-house.

Cheeses are never sweated in Scotland, as is common in the English dairies; neither are they ever stored above the cow-houses to receive the breath of the cows to contract a particular flavor. Heating them till they throw off part of their fat, can never make them richer or of finer flavor, but the reverse.

But after all that can be done, cheeses which are made in the same way from the milk of the same cows, and every operation performed alike, will differ considerably in quality and flavor. This diversity is greater in the Scots than in the English cheese, owing probably to the former being made in ill constructed houses, and with imperfect apparatus, while in England the dairies are large, the dairy-houses of superior formation, and the operations more uniformly conducted. Milk is more easily contaminated with the slightest impurities than any other substance in common use. It is fortunate that, while there are diversities in the qualities and flavor of cheese, there are also diversities in the taste of its consumers.

Scots cheeses are never formed of a round shape like cannon balls, as some of the Dutch are; they are rounded on the edges, and flat on the sides; and the greatest part of them are from 15 lbs. to 50 lbs. *avoidupois* in weight, many of them heavier. Cheeses of these weights do not readily become tough, dry, and horny, and they of course do not contain so large a proportion of crust, as small cheeses.

Scottish cheese does not swell so readily as the Cheeshire and Dutch cheese. That defect does not proceed from the clover or other particular food given to the cows, as some have imagined, but is produced by the introduction of impure air into the milk or curd, or from impure rennet. The extraordinary breaking of the curd in the Dutch dairies, and the skewering of the English cheese, described by Mr. Holland, cannot fail to introduce flatulent air into the curd and cheese, and produce swelling. *Pungency* of taste probably proceeds from the same causes. *Coloring* cheese with *arnotto* has been practised by some cheesemakers in Scotland, but the practice has never become general, and is not now so common as formerly. *Arnotto* is a harmless article, but as it has a tendency to dry the cheese too much, and can do no good, it may well be considered as a needless application. The cheeses made in Scotland are neither washed, nor rubbed, nor greased, on the outside, nor painted like some of the Dutch and English cheeses; but merely laid up to dry on clean boards, in a place neither dry nor damp, and turned over; and yet they are free of cracks or mouldiness on their crust. Cracks proceed either from the milk having become sour before the cheese was made, or from the cheeses being exposed to too much drought when laid up to dry; and mouldiness proceeds from their being kept in a place that is too damp. Blistering or whey-springs are seldom seen in Scottish cheese.

The Dunlop cheese is generally not so acrid in the taste as most of the English cheese, nor is it

so hard and dry as that of Holland; it is softer and fatter than either. A tasting of the high-flavored English or foreign cheese, after a good dinner, may please as a relish better than the softer and milder Scottish cheese; but when a quantity of cheese is to be eaten at luncheon, or a Welch rabbit is desired for supper, it is preferable to the English, which not unfrequently affects the olfactory nerve. Some inferior cheeses are unavoidably made, in even the best managed dairies; and both farmers and cheesemongers may, at times, palm inferior cheese on those who cannot judge for themselves. In making this species of cheese, the average return is one stone of 16 lbs. of 24 oz. to the pound, from every 60 Scottish pints of milk, which nearly corresponds to 179 imperial pints. Dunlop cheese has nevertheless been much improved in the course of the last twenty years, and the demand for it is steadily increasing.

Skim-milk cheese has been made in Britain ever since the Romans taught our ancestors the art of cheese-making. The mode of making it does not differ much from the way of making full-milk cheese, as described above. The milk is in Scotland generally allowed to remain from thirty-six to forty-eight hours in the coolers, in order to cast up the whole cream. This is the greatest defect in the dairy husbandry. It would be better not to allow the milk to stand more than twenty-four hours, as is usually done in the Dutch dairies. By taking off the cream at eighteen or twenty-four hours, a smaller quantity of butter is of course obtained, but it is of superior quality; and the skim-milk by having a part of the fat, and not being too long exposed to the air, is richer for cheese than when the milk is exposed in the coolers for thirty-six or forty-eight hours. Skim-milk coagulates readily. The whey comes freely off the curd, and the cheese is easily formed and pressed.

The whey taken from milk when made into cheese, is partly used by work people as a drink, or made into porridge with oat-meal, but the most of it is given to horses, cows, and swine. The whey from the milk of three cows will, with a small supply of other food, raise a pig of the value of 10s. or 12s. in April to the weight of 15 or 20 stones by December. Some have boasted of collecting butter from whey. It has been shown that when the operations of cheese-making are rightly conducted, no butter worthy of attention can ever be procured from whey, except through gross mismanagement in the making of cheese.

The rennet in general use is formed from the gastric juice of animals, particularly that found in the stomachs of calves, hares, poultry, &c. Various other substances, as acids, alcohol, sugar, and the juices of several species of vegetables, will coagulate milk; but as the stomachs of calves form the most abundant and powerful congluma yet known, scarcely any other is ever used.

Rennet is prepared in various ways by different people. Mr. Marshall, the eminent agricultural writer, says the stomach, when taken from the body of the calf, should be well cleaned of milk, curd, chyle, &c. and the clean bag salted and placed in an earthen jar for three or four days, till a juice or pickle is formed; after which the bag should be taken from the jar, and hung up to dry for two or three days, to let the pickle drain off, and then it should be returned to the jar, the

mouth of which should be covered with paper, which should remain till the bag is used a year or so after. When the rennet is wanted, the bag is taken out of the jar, a handful of each of the leaves of the sweet-briar, the dog-rose, and the bramble, are boiled together for fifteen minutes in a gallon of water, into which three or four handfuls of salt have been thrown, and when the liquid has been strained and allowed to cool, the bag is put into it, and the longer it remains in the liquid, the stronger and better will the rennet be. A wine half pint (two gills) of that liquor will, Mr. Marshall thinks, coagulate fifty gallons (a hundred Scottish pints) of milk; and he says the coagulum is formed in an hour or two hours and a half, and sometimes not till three hours after the rennet is mixed with the milk.

Rennet is prepared, however, in a very different way in Scotland. So far from throwing away the curdled milk that may happen to be in the stomach of the calf, when killed, or washing away the chyle, both are carefully preserved, and they are found to strengthen and enrich the rennet. It is, in fact, the chyle formed by the gastric juice mixing with the milk in the stomach of the animal that forms the coagulum; and instead of throwing that away, as Mr. Marshall directs to be done, the Scottish dairymaids are at pains to preserve and increase the curdled milk, by giving the calves as much milk as they can drink a few hours before they are killed.

When the stomach is removed from the calf, it is examined, and all impurities, such as straws and other food than milk, are carefully removed. A considerable quantity of salt (two handfuls at least) is put into the bag and on the outside of it, and being rolled up, it is hung near a fire to dry; and it is understood to improve by hanging a year or more before it is used.

When rennet is wanted, the dried bag is cut into small pieces, and put into a jar with a handful or two of salt, and a quantity of water that has been boiled, and cooled to about 65°; or new whey taken from the curd, is poured on the bag in the jar. If the bag is that of a very young calf, a quart of whey or water will be sufficient; but if the calf has been fed for some time, twice that quantity of liquid may be applied. The infusion may be allowed to stand three days or so in the jar, when the liquid is drawn off, and about an English pint (four gills) of water or whey is poured on the bag in the jar, and allowed to remain two days. Both these portions of liquid are mixed, and strained to remove impurities; the liquor is put into clean bottles to be used as rennet, and the bag is thrown away. The rennet, so prepared, may be used immediately, or be kept for several months, as may be convenient. Some put about a dram glassful of whisky into the infusion.

When the rennet is rightly made, a table-spoonful of the liquid will coagulate sixty Scottish pints (120 quarts) of milk in ten or fifteen minutes. I have known milk sufficient to make thirty stons of cheese coagulated by rennet made from the stomach of one calf.

Mr. Marshall says, that, when the curdled milk in the stomach of the calf is used in making rennet, it gives the cheese a harsh taste. But every person who knows any thing about the quality of cheese must know, that the Scottish cheese is seldom so harsh or sharp tasted as the English. I

am also disposed to believe that the leaves of the plant which have been mentioned, and of which infusions are mixed into the English rennet, must have the effect to make the cheese swell; while the flavor they must impart to the cheese does not appear very prepossessing.

From the Cultivator.

BOOK FARMING.

We have been told of the following facts, and have only to regret that the like to them are not of more frequent occurrence. A number of intelligent farmers residing in a neighborhood, somewhere, we believe, in Dutchess county, concluded to form a farmer's association—to make a common stock of their knowledge and observation—believing that knowledge, like money, would be productive in proportion to the capital. It was known that A. raised the best horses, and got the best price for them; that B. was far more successful in his wheat and corn crops than his neighbors; that C. reared the finest neat cattle, and kept the best cows and oxen; that D. excelled in sheep husbandry; and, in short, that some individual excelled the rest in a particular branch of husbandry. Each possessed not only some excellence, but some glaring defect in his management. Thus the farm stock of one were sickly, and many died, because the owner did not know how to manage them; another's farm had become dreadfully impoverished, from neglecting the manure, and from close cropping; while the farm of a third was neither fit for plough land, or for sweet grass, on account of the water which every where saturated the soil, and rendered it poachy, cold and sour. Unlike too many now a days, each of these men was conscious he could learn much from his neighbor's practice, which would enable him to manage his farm with more profit—and that he could teach his neighbors something in return. These expectations were amply realized; but as the members lived somewhat remote, it struck them that it would save much time, and be a more sure way of rendering the improvements of all available to each, if they were to write down their practice in the particular branch in which they respectively excelled, and the principles, or science, upon which that practice was based. This was accordingly done; and for their mutual convenience, as well as for the benefit of others, the whole was printed, and these men were afterwards denominated, by some of their envious neighbors, *book farmers*, because they took their instructions from a *printed book*. This did not disturb them: for they got from their book the secrets by which the others had excelled in their particular department, and each profited by the good management of his neighbors. The consequence was, that all gained by the interchange. The defects of all were speedily remedied, and in a few years prosperity crowned their labors; and they now exhibit, we are told, the best models of profitable farming any where to be found in the land; and they enjoy the felicity of reflecting, that while they have greatly benefited themselves and their families, they have, by their example and instruction, done much good to others. They have afforded a fair illustration of the advantages of book farming, when combined with intelligent practice.

Were this example extended to the farming

community of our country, how greatly the work of improvement would advance, and the comforts of the human family be multiplied: were each to contribute his mite of practical knowledge, in the branch in which he most excels, what a treasure of information would be collected, to guide us in our practice, and to stimulate us to habits of industry. And do we not already possess, in a considerable degree, these precious advantages? What are our agricultural journals, but a record of instructions, by the best farmers of our own and every other country—a detail of the methods by which they have succeeded—have excelled—in the various departments of husbandry? There is not a man in the community who may not profit, in some degree, by the teachings of these journals. The self-wise are ever the most profoundly ignorant; for as we advance in knowledge, we become more and more humbled by the consciousness of our comparative ignorance.

We beg that the readers of the Cultivator will take this matter into serious consideration, and remember, that an obligation rests upon them individually, to requite the favors which they are monthly receiving from others, by communicating whatever of their practice that may promise to be beneficial to their brother farmers.

From the Cultivator.

GRAIN WORM.

We promised to insert the memorial of the State Agricultural Society to the legislature in this number; but as we understand that the committee to whom it was referred, deem it not worth reporting upon, we shall content ourselves with stating its purport. The journals of the day noticed it as being an application *for aid*. The fact is not so. The memorial states, that the ravages of the grain worm have become alarming; that in some of the northern and eastern countries, the loss incident to their destruction of the wheat crop has already exceeded, by computation, two hundred thousand dollars; that it is progressing south and west, at the rate of 40 to 60 miles a year; and that unless some means are devised to check the evil, it threatens to become destructive to the great staple of the west. Viewing the magnitude of the evil, and the prospect of its greatly increasing, the society thought it might comport with the duty and the dignity of the legislature, who are appointed to watch over the interests of the state, to endeavor to arrest it, by holding out pecuniary rewards for the discovery of an efficient remedy. This, they supposed, would tend to call the attention of scientific as well as practical men, particularly to the subject, and might eventuate in the discovery of a preventive of the evil—in which case the state would be benefited a thousand times the value of the premium to be paid—and if no such discovery should be made, then the money would remain in the treasury. There are men, who still believe it is impious to raise rods to avert the lightning from our buildings. The money which is often spent in a day's useless debate, at the shrine of personal vanity, if offered to check this evil, *might* save the state many millions of dollars—and could not possibly do any harm.

From the American Journal of Science and Arts.

A LIVE SNAKE SUSPENDED BY SPIDERS.

Batavia, N. Y., Sept. 30, 1835.

Sir—In the "Spirit of the Times" of this village, of the date of Aug. 26, 1834, I published over the signature of "A Witness" an account of a *snake* found suspended by spiders' web, by the tail, in the wine cellar of a gentleman in this village.

A gentleman who also saw and examined the phenomenon, promised to send you a drawing and account of it. Whether he has done so or not, I do not know. And as the story has been treated as a fable by some of the papers, I send you enclosed the account above mentioned, and a correct drawing, (though rough and done in haste,) made by James Milnor, Jr. Esq., a clerk in the Holland Company Land Office.

The gentleman in whose wine cellar the snake was found, is the Hon. David E. Evans, agent of the Holland Land Company, who requests me to forward to you the drawing and account, which he pronounces to be accurate.

Mr. Evans, Mr. Milnor, Mr. Mix, Dr. Van Tuyl, and a great number of other gentlemen, examined this subject critically on several different days, while the snake was yet alive, and all concur in the accuracy of the account.

I hope you will procure a correct engraved cut of the drawing, and publish it with the account in your journal. And if you do, you are at liberty to use all the names mentioned in this letter, or to publish it at length, if you think proper.

Most respectfully, your obedient servant,

S. CUMMINGS.*

The following is the account alluded to in the above letter:

On the evening of the 13th inst., a gentleman in this village found in his wine cellar a *live striped snake*, nine inches long, suspended between two shelves, by the tail, by spiders' web. The snake hung so that his head could not reach the shelf below him, by about an inch; and several large spiders were then upon him, sucking his juices. The shelves were about two feet apart; and the lower one was just below the bottom of a cellar window, through which the snake probably passed into it. From the shelf above it, there was a web in the shape of an inverted cone, eight or ten inches in diameter at the top, and concentrated to a focus, about six or eight inches from the under side of this shelf. From this focus, there was a strong cord made of the multiplied threads of the spiders' web, apparently as large as common sewing silk; and by this cord the snake was suspended.

Upon a critical examination through a magnifying glass, the following curious facts appeared. The mouth of the snake was fast tied up, by a great number of threads, wound around it, so tight that he could not run out his tongue. His tail was tied in a knot, so as to leave a small loop, or ring, through which the cord was fastened; and the end of the tail, above this loop, to the length of some-

* We understand that Mr. Cummings is first Judge of the Court of Common Pleas in this county, and also Postmaster of Batavia.

thing over half an inch, was lashed fast to the cord, to keep it from slipping. As the snake hung, the length of the cord, from his tail, to the focus to which it was fastened, was about six inches; and a little above the tail, there was observed a round ball, about the size of a pea. Upon inspection, this appeared to be a green fly, around which the cord had been wound as the windlass, with which the snake had been hauled up; and a great number of threads were fastened to the cord above, and to the rolling side of this ball to keep it from unwinding, and letting the snake down. The cord, therefore, must have been extended from the focus of the web, to the shelf below, where the snake was lying when first captured; and being made fast to the loop in his tail, the fly was carried and fastened about midway, to the side of the cord. And then, by rolling this fly over and over, it wound the cord around it, both from above and below, until the snake was raised to the proper height, and then was fastened, as before mentioned.

In this situation the suffering snake hung, alive, and furnished a continued feast for several large spiders, until Saturday forenoon, the 16th, when some persons, by playing with him, broke the web above the focus, so as to let part of his body rest upon the shelf below. In this situation he lingered; the spiders taking no notice of him, until Thursday last, eight days after he was discovered; when some large ants were found devouring his dead body.

A WITNESS.

Extracts from the last No. of the British Farmer's Magazine.
SUCCESSFUL STOCK MANAGEMENT, BY SMALL FARMERS.

Moses Greer, of Corlust, was entitled to the first premium, for best stock, fed upon the smallest quantity of land. It appeared that he had fed his stock of four cows and two calves upon the astonishing small quantity of one acre and two roods of land all summer—being about one rood and four perches for each cow, after allowing for the calves and had three roods of turnips and one of rape for winter.

Moses Greer being called on to give an account of his farming, said: "My lords and gentlemen, I hold eight acres and three roods of land, which I have now got into the highest condition, and I shall in future be able to keep it so without going to the expense in lime which I have heretofore been at, by reason of the great quantity of manure I make from my increased stock of cattle, consisting of four cows and two calves; and it will surprise you to hear, that this stock has been fed this last summer, and up to the present time, on clover and vetches, upon the identical same piece of ground which, when formerly in grazing, fed only one cow, and that very poorly. My land is held partly at 23s., and part at 8s. 3d. per acre; and my rent amounts to £7 14s. 6d. yearly; and I have already sold butter to the amount of £11 4s., clear of all deductions, and have had enough of milk and butter for myself and my family besides. The abundance of manure has enabled me to set as many potatoes as my neighbors, holding the same quantity of land, and I have as much crop too, besides having my turnips likewise. In conclusion, I am satisfied there is no way in which land can be

made to produce so much, or in which it can be brought into such heart, as by the soiling system and four-course rotation of crops, from which I expect every year to derive greater advantages; as I may say, I am only just now beginning to feel the benefit arising from it; my land being now all perfectly clean, and not any of it whatever in pasture."

James Rolsten, being next called on, said, "I am likewise an advocate for green feeding; I had more clover than fed all the stock I had although I had more than doubled it; and I was enabled to save three five-fathom cocks of hay, which will leave me all my straw for manure. After cutting my early vetches, I sowed the ground ridge by ridge as I cut it, with rape, which I am now cutting a yard long and giving to my cattle, so that I shall not have to begin to use my turnips for some time; and it will be again fit to cut in April next, when the turnips begin to fail. I have also levelled every useless ditch; and my land, so far from being exhausted by the four-course rotation, is every year becoming better."

Mr. Ingram said, "I am still of the same opinion as I have formerly expressed, of the benefit to be derived by green crops and house-feeding, which I continue to practice. I find I can thereby increase my stock and my crop also, and have manure for my potatoes and turnips; besides, by this means, I find my land improving under the four-course rotation; and though I am paying according to a late valuation, I am still able to say, as I said last year, I shall be able to make my rent from my dairy."

Thomas Bruce said, "when I came into possession of my farm in 1831, there was no more than about half an acre of potato ground; and this in such a dirty bad condition, that it had to be dug over with a grape, in order to clean it before it could be sown with grain and clover seed. The rest of the land was in a miserable exhausted state, not fit to produce any thing; and I was then possessed of but one cow, and had no meat to feed more; that year I sowed a few turnips upon what manure I had to spare, by employing lime compost for my potatoes; and the next spring, between compost and cow-house manure, I was able to set an acre and a half of potatoes, and half an acre of turnips. That year I was able to house-feed, upon the clover and some vetches, two cows, and had plenty for them all winter. Next spring I had so much manure, that with some assistance from lime compost, I was able to set two acres and a rood of potatoes, and three roods of turnips; and having sowed more clover, I was enabled that season to keep three cows and a horse, which stock I still have, with the addition of a calf, and have fed them this season on five roods of clover, two roods of vetches, and one rood of grazing, which being chiefly on a rocky bottom cannot be broke up; and if an acre was allowed for the keep of the horse, and twenty perches for the calf, this would leave only one rood and four perches for the summer feeding of each cow; and this, with one rood of turnips for each during winter, (which would allow, at 34 tons per acre, near 90 lbs. a day for each for seven months,) would only make 84 perches, or little more than half an English acre for the year's keep; and I have a rood of rape as a stolen crop besides, so that I have plenty of food for them; and my land

is improved to such a degree, that there is more than three times the return from it than what it formerly gave, and I shall now be enabled to keep it in heart by the manure made by house-feeding, without any of the expenses for lime which I have been formerly at."

Mr. Bigger stated, that he held about five Irish acres of land; that he formerly kept but one cow, and had barely food for her. He now kept three and an ass; and part of the year a horse; and after all had clover to spare, to consume which he had bought fourteen young pigs, some of which he still had, and was feeding on potatoes; and had besides sold off the same farm £10 worth of wheat.

Extract from the Southern Agriculturist.

RUST IN COTTON.

The cotton crop in this district of country has not averaged more than 100 pounds of clean cotton to the acre. The rust, that extraordinary and increasing evil, has, apparently, taken hold of all of our high lands. I have, for many years, believed, and still believe, that fire, passed over the land, is the best preventive within our reach; never having doubted that a great portion of the injuries to which vegetable life is subject, owes its origin to the insects that, in countless numbers, fill the earth, the air, and the water, I have believed, that in consuming by fire the vegetable matter upon the surface, something, at least, would be done to lessen their multiplication. But some more efficient remedy must be found. Where the lands are low enough, I would cover them with water during the winter. When this is done, however, it must not be done by halves. The water must be kept deep and long upon the lands. I am in a course of experiment, at this time, upon this subject. I have 250 acres of low ground which have been under water since the 1st of January—nor shall I withdraw the water from the land until the 1st of April; after which, I will, as speedily as possible, plant my corn and cotton in the ridges of the previous year—in the hope that the grass seeds will, by this long immersion, be swollen and destroyed, and that even the chrysalis of the cut-worm, (the great enemy to cotton and corn in low grounds under dry culture) may perish in this long flooding.

THOMAS SPALDING,
Of Sapello Island, Darien, Georgia.

From the Ohio Farmer.

CULTIVATION OF THE ORANGE, LEMON, &c.

This beautiful family of plants, embracing the orange, lemon, shaddock, citron, lime and their congeners, is one of the richest ornaments of the green-house. All the varieties are almost as easily raised as the peach-tree, and being sufficiently hardy to withstand a slight freezing, if rightly protected, can be secured, with a little trouble, during the severest winter weather.

1. Stocks.

The lemon furnishes the best stocks. Sow the seeds of ripe fruit in crocks, filled with a compost

of new earth, from under rotten logs or stumps, garden mould and decayed cow-dung, each one part, very fine and intimately mixed. These crocks should be plunged to their rims in the earth within a well regulated hot bed, early in the spring, and their contents be regularly watered.

When the young plants are one inch high, they should be thinned out and transplanted, one to a pot, taking care to leave, undisturbed, one of the largest, which is to remain for inoculating, during the present season.

Continue to water the seedlings daily, and after stir the earth about their roots with a knife or spatula. When they are removed from the hot-bed place them in a situation protected from cold, northern winds, and also from a full exposure to the full blaze of the noon-day sun.

2. Budding.

There are two periods when this can be performed successfully. To wit: During the first growth of the stock in the month of June, and the second in the month of August. This state can be detected by the absence of the terminal buds on the ends of the limbs and the ease with which the bark separates from the wood.

The buds used for insertion during the former period should be taken from the last growth of the preceding year, and during the latter from the first growth of the present season.

Select the roundest and fullest buds, and if possible those that are not armed with a thorn or spine from trees which are abundant bearers.

Make choice of a smooth place, upon the stock, and proceed as in common inoculation, only place the transverse incision below the perpendicular one, so as to resemble the letter T inverted thus $\perp$, so that the buds when inserted shall be pushed upwards instead of downwards. It may sometimes be convenient, with small stocks, to remove the dirt about the root, and insert the bud below the surface. Having made the transverse and perpendicular incisions, cut out, immediately below the latter, a semi-circular notch, thus $\perp$ for the purpose of facilitating the introduction of the bud between the lips of the bark. Do not attempt to separate the thin film of wood that adheres to the inner surface of the bud. When the bud has been carefully pushed into the perpendicular incision, secure it there with a strip of Russia matting or linn bark that has been long macerated in water: care not to pass it directly over the eye of the bud.

The pots should then be placed entirely out of the reach of the sun, but not underneath the eaves of a house or limbs of a tree. Water the plants daily, but use special care not to permit the water to run down the stock, as it would destroy the inoculation.

At the end of two or three weeks the foot stalk of the leaf of the bud will drop, and the stock begin to swell above and below the ligature, which should now be removed or loosened. If it be in the month of June, cut off the stock about three inches above the inserted bud, and in a few days the second growth will commence, and that bud will burst forth with great vigor. If it be in August, delay cutting off the stock until the ensuing spring, unless there is an evident disposition to put

forth, by the bud, which sometimes happens late in the summer.

In one instance the writer of this article had an inoculation six inches high in November, growing on a stock raised from a seed sowed in the month of March of the same year, and in three years it had upon it six large and ripe oranges.

3. Fruiting.

As soon as the blow-buds begin to show themselves, the compost should be changed in the tops of the pots, and this should be repeated every six weeks until the fruit is mature. During the whole of this period the trees require extra quantities of water, particularly at the time the young fruit is setting.

If an excess of fruit should form, it should be picked off.

During very cold weather and while the trees are not in active growth, they require much less water.

4. Protection in Winter.

They can be protected in a healthy state in almost any tight parlor or setting room, provided they are not exposed too directly to the scorching heat of the fire, and are furnished with a frequent supply of fresh air.

REMARKS ON THE ACTION OF PUTRESCENT MANURES, AND THE OPINIONS OF J. M. G. THEREON.

To the Editor of the Farmers' Register.

*New Town, King and Queen }
County, March 21st, 1835. }*

In the March No. of your periodical is a communication signed J. M. G., containing critical remarks upon an able and learned essay in your January No. signed J. B. I am always happy to see an application made of science to agriculture; and both your correspondents have afforded me much pleasure, amusement and information, by the scientific tenor of their observations. It is to be desired that the facts and the principles of science should more frequently be brought into use, to elucidate and settle disputed points in husbandry. Chemistry has accomplished much, that if applied, would be of great practical utility to the farmer; and I doubt not, as it advances, it is destined to achieve much more that may improve and throw light upon the agricultural art.

In the course of J. M. G.'s communication he propounds a theory, and supports it by many plausible *a priori* arguments, for the decision of the long controverted question of the proper mode to apply manures to the soil. This theory I intend to examine with the same freedom, and the same feelings of respect for its able author, that characterize his interesting investigation of some of J. B.'s positions. His hypothesis is contained in the following sentence: "Providence has given her (the earth) the power—a kind of chemical affinity or elective attraction (as I beg leave to call it,) of drawing to herself and uniting with all extraneous substances in contact with her surface, which are susceptible of conversion into the food of plants." Again. "The only thing assumed in the forego-

ing hypothesis, is, that the earth and the atmosphere having to nourish plants in a different manner and by different means—one being the nurse below—the other above ground, neither can possibly take from the other any thing which itself cannot use for their joint object." The conclusion deduced is, that manures should be applied to the surface. In the first place I would remark, that admitting the existence of this chemical affinity of the earth, it would be exerted to greater advantage were the substances and the earth mingled together—that is, were they turned into the earth; because chemical affinity only acts at insensible distances, and the better the mixture of any two things having a chemical affinity, one for the other, the more rapid and perfect will be their combination. Again: this hypothesis assumes, that totally different substances are furnished by the atmosphere and the earth in the economy of vegetation, and hence, that in the harmony of things, they would not, or could not pilfer from one another. So far from this being the case, the nourishment supplied by each, is, to some extent, the same, only in a different state. Water is imbibed by the roots of plants, and when suspended in the atmosphere it slakes the thirst of the leaves. Carbonic acid gas, oxygen, hydrogen, and nitrogen are all found in the atmosphere, and yet these are the very elements that make up the substances which, when in a state of decomposition and solution, the earth supplies as food for her vegetable offspring. The carbon, which is one of the principal constituents of wood, is made up as well from carbonaceous matter received through the roots as the carbonic acid gas received through the leaves. According to a well established law of chemistry, all bodies are susceptible of three states, the solid, liquid, and aeriform state. By an addition of a sufficient quantity of heat, a solid is converted into a liquid, and a liquid into an aeriform state. Water affords a most familiar illustration of this general truth. We have all seen it in the solid, liquid, and gaseous form. When manure heaps are subjected to violent fermentation, half of their substance often ascends in gas, and is dissipated by the four winds. When stable manure is applied to the surface of the earth, carbonic acid and ammonia are disengaged and "lost" in the atmosphere during the process of decomposition; whereas, if it be covered in the soil, these substances contribute nutriment to the roots of plants. This has been shown conclusively by Sir H. Davy, who introduced a retort containing manure in a state of fermentation among the roots of grass in a border of his garden, and found at the end of a week that the grass was much more luxuriant there, than any where else. It may be, that the gases were not taken up in their aeriform state by the roots, but combined with fluids. Carbonic acid is absorbed by water: and such is the affinity of water for ammonia, that it will combine with 750 times its own bulk.

But your correspondent inquires,—“Would the earth keep gas (which by the way, is as great a physical impossibility as to prevent water from seeking its level) when she could not apply it to the nurture of her children—that application being the natural province of the atmosphere.” To be convinced that the earth holds gas, it is only necessary to place a small piece of fullers-earth in a tumbler of water, and as it crumbles to

atoms, the gas may be seen ascending to the surface in bubbles. Such is the extreme tenuity of aeriform substances, that they will penetrate wherever there is the smallest opening. Nature is said to abhor a vacuum, and whatever space is not filled by solids or fluids, that we may expect to find occupied by gas. The interstices of the soil contain it, and that there are interstices, the least observant may be convinced, from the fact, that water is strained through them and descends into the veins of the earth.

Sir H. Davy ascertained by experiment, that the presence of oxygen gas is essential to the germination of seed. We need not doubt then, of its existence in the soil. But I imagine that your correspondent could not have intended to assert, though his language would admit of that construction, that there is no gas in the earth, but that the earth cannot retain any particular species or portion of it for a length of time, or permanently. It would be difficult, if not impossible, to ascertain how much of, and for how long a time, a given portion of gas would be retained by the earth. The changes to which the surface is subject, from the influence of heat and moisture in producing contraction and expansion, render this impracticable. But this can be safely asserted, that some of the gases evolved by decomposition in the soil, are taken up by the earthy constituents, and also by water, which may be present. This much at least is gained, when if decomposition takes place on the surface, the gases set free, are in a few moments mingled with the great mass of atmosphere surrounding the earth.

Again: manure covered three, four or five inches in the soil, suffers less heat than at the surface—and of course, there is less tendency to volatilize. I am also induced to think that the decomposition is more gradual; for, although there is more moisture, there is less of the two other essentials—air and heat.

But my object in this communication is to examine the theory of J. M. G., which, if correct, puts this question forever to rest. As it is a chemical theory, I have tested it by chemical principles. I will not, therefore, go into the general argument in favor of turning in manure. J. B. has done this with great ability. But as there are two arguments which he has barely touched, and has not, I think, given them proper prominence, I will give them here in the language of Sir H. Davy.

"Besides the dissipation of gaseous matter, when fermentation is pushed to the extreme, there is another disadvantage in the loss of heat, which, if excited in the soil, is useful in promoting the germination of seed, and in assisting the plant in the first stage of its growth, when it is most feeble and most liable to disease: and the fermentation of manure in the soil must be particularly favorable to the wheat crop, in preserving a genial temperature beneath the surface late in autumn and during winter."

"Again: it is a general principle in chemistry, that in all cases of decomposition, substances combine much more readily at the moment of their disengagement, than after they have been perfectly formed; and in fermentation beneath the soil, the fluid matter produced is applied instantly, even while it is warm, to the organs of the plant, and consequently, is more likely to be efficient,

than in manure that has gone through the process, and of which all the principles have entered into new combinations."

But your correspondent says, that "nature's method we must believe the best," and that she applies "the deciduous parts of trees and smaller plants to the surface." And again he speaks of the "admirable rule," follow nature! Now I would suggest a medical maxim, which is as applicable to vegetable as animal life—"assist nature." It is in obedience to this principle that we cover our seed in the soil, pulverize our lands, cultivate our crops, trim, accelerate and improve the growth of our fruit trees. Were we to follow one of nature's habits, and neglect the rest, which, I humbly conceive, would be the case in exposing our manure on the surface, we might with the same propriety follow another of her habits: scatter our seed to the winds, and depend upon the earth, the air, and the rains to cover, sustain, and mature them. These are nature's agents, by which she executes all her husbandry; she uses not the ploughshare nor the pruning hook. It is the business of the agriculturist to aid nature—and in following nature we should have reference to all her laws—and not follow one of her habits to the exclusion of the rest. She deposits her seed for perpetuating their offspring upon the surface; and by rains, frosts, and animals, units are made to vegetate, for thousands that decay, and dissolve into their original elements. She is rich in her stores, but man must husband his resources. She has the interests of the universe to attend to—man his own. It may be, that by the decomposition of vegetable matter upon the surface, the atmosphere is replenished with the gases, of which she has been deprived in the process of vegetation. Whether this be so or not, it is doubtless intended in the economy of nature for some wise purpose. Let not the farmer then, who spreads his enriching stores and invites air and earth to divide for themselves, when he finds that the aërial sister has taken more than conduces to his individual interest, charge her with "grand or petty larceny;" for what is taken from him, she will diffuse through the universe, and return in some other form to her sister. Let him not complain of this as capricious or unjust on the part of the more lofty dame—for "partial evil is universal good."

W. B.

QUERIES ON THE CONSTITUTION OF SOILS.

To the Editor of the Farmers' Register.

In your treatise on calcareous manures, you disclose the remarkable fact, that in the limestone regions of this state, in general, no lime can be detected in the soil, upon an analysis. You suggest, that probably the carbonate has been converted into the oxalate of lime. If this be the case, why is it that the oxalate of lime is not discovered, upon analysis?

In the same essay you give the opinion, that oxalic acid exists in most of our soils in Eastern Virginia. If so, why cannot that be detected, by analysis?

If your engagements will admit of your devoting time enough to answer these queries, you will oblige

A SUBSCRIBER.

[The positions referred to above, are not precisely as there stated. It is not asserted that the limestone soils of Virginia generally contain no *lime*, but that they contain none in the form of the *carbonate*, which is most usual, and in which form it would be supposed to be present. Neither is it said that the *oxalic acid* exists in most of the soils of Eastern Virginia—but that some vegetable acid does, which if not the *oxalic*, is composed of similar ingredients, and may easily by some of nature's operations, be converted to the *oxalic acid*.

But even with these corrections, we are unable to give any answer to the inquiries, more satisfactory than this—that no good chemists have yet applied their labors to investigate these subjects—and but very few have been induced to cast a thought upon them, by the reasoning presented in the work referred to above, the existence of which is scarcely known to men of science. But there have been recent chemical discoveries serving to maintain the doctrine of vegetable acid in soils, information of which has reached this country since the publication of the *Essay on Calcareous Manures*, and which will be quoted at length in the forthcoming second edition—one of the first copies of which will be sent to our correspondent, as more explanatory than any thing that could be stated separately in this place.

But even with these recent lights, furnished by Berzelius and other chemists, the subject of acid in soils is still involved in much difficulty and obscurity, and needs, and would well repay, the labor of investigation of any who can bring the science and operative skill necessary for the task. That the author of the essay referred to is most desirous that this should be done, and, that his assumptions should be properly and strictly tested, has been stated in every publication on the subject, from the earliest to the last.]

From the Farmer and Gardener.

CORN-STALK FODDER.

In some late numbers of your "Farmer and Gardener," I read with much pleasure a detail of the management of the corn-stalk as a food for cattle, &c. First induced to turn my attention to this subject by the different communications to be found in the "Farmer," for some years back, I began in 1830 to test the value of the refuse of corn, when subjected to the process of steaming. I was not long inventing a strong, rough apparatus for my purpose, which succeeded well, and in which I prepared about twenty bushels at once. Previous to this, I had, however, fallen on a plan of saving my corn and stalks, &c. somewhat different from my neighbors; but in a way that the columns of your valuable paper had been long laboring to persuade the corn planters of the country to try fairly, viz: to cut down the stalks at the ground, at a certain stage of maturity, and at one effort to cure corn, stalks, blades, &c. in the field. I had seen this first practiced on the south branch of the Potomac, as far back as 1812: and about 1817, I determined to try the process in this section of the Union, not being able to discover any solid reason why it should not succeed as well

here as on the south branch of the Potomac, or elsewhere; but indeed compelled to believe, from a recollection of the climate I was in, that it must succeed here much better. In 1817, I tried six acres—cut it down at the ground, about a week after the blades were ready for stripping. I found a little shrinkage in the grain, but I felt satisfied, that as my corn was not like Pinder's razor, "made to sell," but to eat, that what was lost by the shrinkage was no part of the nutritive principle; and I did not despair of getting over that difficulty, by further trial, and by improving the mode of proceeding.

The following year I cut down five acres. I began the saving of this field of corn by going through it, as soon as a few of the under blades appeared ready to pull, and gathered and brought them home, throwing them in an old out-house to cure, and which, by a little turning over, I readily effected. I will remark here, that this five acres was a piece of corn on which I was trying the effect of rotten cotton seed as a manure, by planting four stalks in the hill, on light land, at the distance of five feet by four. On this field I had determined also to try the full effect of an economical management, in saving the result of labor bestowed on the earth—"Save all" was my motto, and I literally saved every blade.

Before my corn required a second pulling of blades, I found the shuck on the ear in that state, which authorised, I believed, the next step, and the principal one I had in view, the new mode of saving the balance by one "*coup de main*." The result of observation and reflection induced this determination, viz: that in the saving process, the mode of stacking the corn-stalks that would permit them to cure the most gradually would certainly admit the least lost by shrinkage from evaporation, &c. To effect this, I selected four strong, careful hands, to cut and lay down, taking eight rows at a through. On getting to the end of the rows, they turned round, and gathered together sixteen hills, each bringing to one who attended the stacking. As each man placed his armful on the ground the butt ends were pressed by him as far into the earth as possible, throwing the tops together, so that when the sixteen hills were brought together at the tops the mass presented a sugar-loaf appearance, spread well at the bottom, to admit the entrance of air—tying at the top with a bandage of crab grass found among the corn, and twisted into a small rope in a few minutes. In this way I cut and stacked my field. On the 10th day I found by an examination of the inside of the stacks, that the whole was cured in a way that I could not have exceeded by any other process, although the weather had been rainy occasionally. I hauled the whole home, and packed it away under open sheds, and in old out houses. In this state it continued, until winter's bleak and stormy weather admonished us that in-door business was to be attended to; when all hands went to stripping "corn and fodder from stalks." In doing this, I observed the following order, viz: each individual threw his ear of corn, as he pulled it off, behind him, and his stalks on one side, laying them down with attention to regularity; and the fodder on the other—as soon as he had an armful of stalks to remove, he rose and placed the stalks in a pile, casting the fodder into another depository. All this precaution, as regarded the stalks was to have them in a

situation that with expedition and convenience they could be placed in the cutting-box, to which they were to be subjected. In one day's work, I had a prodigious pile of stalks thus stripped. The next rainy day I brought in my "Eastman," and a man and a boy soon reduced the pile to pieces, half an inch in length. Here, sir, I would just remark, what a quantity of this labor I got through within a short time, by pursuing every moment systematically, and being prepared for every operation before I commenced it. It will now be readily granted, that I had saved as much of the nutritive qualities of the stalk, shuck, and blade, by my mode of curing, as was possible to effect; and also, that I had prodigiously diminished the labor usually bestowed in the common mode of saving corn and its refuse. At the same time that I was preparing the stalks, I also shucked, so that in cutting up the stalks, I cut, at the same operation, a proportion of shuck with stalk.

But the principal object was yet to begin, viz: to prepare these cut stalks and shucks in such a way as would render them the most nutritious and palatable food for cattle. To effect this, I proceeded thus: I placed three strong hogsheds, made of cedar, well pitched, on the outside, on a platform, about three feet from the ground, having at the bottom a large spigot to let off their contents. Just before these, I had a large trough placed, at the distance of twenty feet, and well enclosed along with the hogsheds. Between the hogsheds and the troughs, I had the steam apparatus placed, all under a shed. Into these hogsheds I threw a small quantity of boiling water, and into the water a portion of corn meal, (coarse ground) just sufficient, when the cask was filled, to produce the vinous fermentation, as if going to distil; with a good straw mat top, for each cask. After an hour, and well stirring, I filled up with cold, soft water, and left the mass to ferment. As soon as my liquid was ready, or just as the acetous fermentation was about to commence, I worked off in my steaming-box a turn of the stalks and shucks, mixed up, and as soon as sufficiently steamed, I placed a quantity in my trough, pressing them well down, with a false top, moveable as I wanted, and now drawing the spigot from the cask ready, the liquid was permitted to cover them, running along a portable, light trough, such as distillers use for conveying water. This I did in the evening, and by morning I took up in light buckets the quantity required for the morning's feeding of my oxen and cows, &c. placing it in the feeding troughs, stepping only a few feet, sprinkling a little salt over the mass. The cut stalks and shucks had become perfectly charged by absorption with liquid, at once one of the most palatable and nutritious preparations yet discovered—of this food I gave them plenty. The effect on the flesh and milk, exceeded my most sanguine expectations. My cattle became excessively fond of it, and I so fed as to "lose nothing."

My casks by a little management, I had always "under way," one always ready. I now ascertained to my full satisfaction, that I could not bestow too much trouble, (as it is called,) in saving my corn stalks!

Satisfied of the value of my labor, I have since added to the steam-box all refuse potatoes, turnips, cabbage leaves, beets, parsnips, carrots and pumpkins, squashes, cucumbers, &c.; in fine all the ve-

getable productions of the field, orchard or garden, as the season may afford, "that nothing may be lost"—and I find that I am well paid for the labor bestowed. The last, after absorbing what they will contain of the liquid, goes to the support of "old Ned."

AGRICOLA.

From the Rail Road Journal.

UNDULATING RAILWAYS.

Washington, D. C. March 30, 1835.

Messrs. Badaall and Stephenson, in their views respecting undulating rail roads, are both right and both wrong. Mr. Badnall's experiments prove, that in locating rail roads in this country, where they must necessarily be undulating, an effect of power may be had not differing materially from the effect had upon level rail roads; and it becomes the duty of engineers, to whom this subject more particularly belongs, to give particular attention to it. Mr. Stephenson's views are correct in favor of level rail roads; but it is out of the question to have them level for any considerable length in this country, or any other. We must then consider the results of Mr. Badnall's experiments as highly useful and important, inasmuch as they demonstrate that the useful effect upon a rail road over an undulating country may be nearly, if not quite equal, to the effect if the road were level. I belong to the craft whose duty it is to make these subjects their study, and if you do not greet me too roughly, may remind you occasionally of

Most respectfully, your

FRIEND.

PORTABLE RAILWAY.

A novel machine was a few days ago exhibited in the Kennington and Clapham roads. It consisted of a sort of carriage-wheel which carries a rail road for itself, upon which the carriage travels with great facility and quickness. It was composed of a jointed square instead of a circle, and has four rollers, not touching the road, and four feet which alternately come to the ground, producing a kind of walking and escaping obstacles. We understand it is the invention of Lewis Gompertz, Esq. Should these machines be adopted, probably common rail roads may be partially or wholly dispensed with.

Translated for the Farmers' Register, from the *Traité de Chimie*, the French version of the work of Berzelius.*

DESTRUCTION OF VEGETABLE MATTERS BY FERMENTATION.

If vegetable substances are exposed to the influence of the air, and at the same time taking care that they do not lose the water which they contain naturally, or that they do not become dry, they begin to be decomposed gradually; and this destruction, which may be called spontaneous, has received the name of *fermentation*. This decom-

*Part of the following extracts, relating to geine and geic acid, have been also used in the Appendix to the Essay on Calcareous Mamures.

position presents many stages. Bodies which contain sugar, furnish at first alcohol and carbonic acid, and this stage of fermentation has been called the *vinous*, or *alcoholic*. They afterwards become acid, produce acetic acid, which state constitutes what is called the *acetous* fermentation. Finally, the greater part of vegetable substances are changed slowly into mould, (humus) and thus undergo the fermentation called *putrid*. There are but few vegetable matters which can pass through these three stages; a greater number commence with the second, and a still more numerous class are susceptible of undergoing only the third, that is to say, of entering into putrefaction.

[The next positions of the work, which treat at length of vinous and acetous fermentation, are passed over.]

Putrefaction.

The last kind of fermentation, or spontaneous alteration of vegetable matters, has been termed putrefaction. The phenomena which it presents, and the products which result from it, are much more varied than those of the preceding fermentations; but they have been much less examined, and in consequence, are less known. The powerful vegetable acids, the vegetable alkalis, the resins, the fixed and the volatile oils, do not pass into putrefaction: on the contrary, bodies which, besides carbon, hydrogen, and oxygen, contain nitrogen and sulphur, putrefy easily. By drying, putrefaction is prevented; and although solid and insoluble bodies may be gradually destroyed in the air, that does not happen when they are completely secured from moisture. Bodies the most putrescent, such as vegetable albumen and gluten, are preserved for an indefinite time, after having been dried. Thus a body enters into fermentation only as it is filled with moisture. But the presence of water is not sufficient: without oxygen, putrefaction does not take place, or it is so slow that it appears to be stopped. It is upon this circumstance that is founded the method of Appert, of preserving vegetable matters for a long time. For example, Appert fills completely a glass bottle with fresh green peas, closes it hermetically, ties and seals with pitch the stopper, and then places the bottle in a pot of water, which he heats to the boiling point. While thus heated, the peas absorb the oxygen of the air contained in the bottle, which is not replaced by the oxygen of the exterior air. The peas are thus preserved without alteration through a whole year. But if the stopper is not perfectly close, air penetrates into the bottle, is renewed, and quickly causes the putrefaction of the peas, which spread a tainted odor. By the same means, both animal and vegetable matters may be preserved. It suffices for that, to place them in vessels closely stopped, and to heat them slowly to 100°, [Centigrade.] The oxygen of the air contained in the vessels, is absorbed in consequence of an action which is the commencement of putrefaction—and the organic matters are then in the midst of an atmosphere of nitrogen gas, and of newly produced carbonic acid gas. Thus air and water are necessary to the production of rapid fermentation; however, their influence is not exerted but with the aid of heat; for under 0°, the temperature at which water

freezes, organic matters do not undergo any alteration. It has been seen that antediluvian animals which had been enclosed in mountains of ice, when exposed finally by thawing, had not undergone putrefaction, although they had remained at least 6000 years in the ice. Organic matters are preserved sufficiently well even at some degrees above 0°, but from 6° to 7°, the phenomena of decomposition begin to show, after some time; from 15° to 18° putrefaction is established promptly, and from 20° to 30° it proceeds with great rapidity. When putrefaction is once fully established, it extends very fast, which may induce the belief, that the products which result from it, have the property of exciting a reaction similar to that which caused their formation.

Organic bodies which rot in open air, absorb oxygen; but they rarely retain it, for ordinarily they disengage a volume of carbonic acid gas equal to that of the oxygen absorbed. When the air does not touch all the points of the bodies which rot, the surface of these bodies present phenomena different from the interior of the mass. At the places where the air is in full contact with the organic matter, every thing is oxygenated, so that the carbon is converted to carbonic acid, the hydrogen to water, and the nitrogen to nitric acid. But when oxygen is not, or is but slightly in contact with the rotting organic matter, the hydrogen combines with the other elements, that is to say, with the carbon, the nitrogen, the sulphur, and the phosphorus. It might be even, that one part of the hydrogen should be furnished by the decomposition of the water. It is the mixture of these combinations of hydrogen, and their being thrown off into the air, which causes putrefying matters to spread such an offensive odor. Vegetable matters, which contain only carbon, hydrogen, and oxygen, are decomposed without producing a very disagreeable odor; but matters which contain nitrogen smell strongly, and when a little sulphur or phosphorus is also contained, the odor of their putrefying body becomes insupportable. As yet, no chemist has set to work to determine with any precision, what are the chemical changes which accompany putrefaction, and what are the properties of the resulting products.

If moist vegetable matters are put in a heap, there takes place, especially in hot weather, a reaction between their elements, in consequence of which the temperature is raised; water is disengaged under the form of a thick vapor, and the mass finally becomes heated to that degree that it takes fire and burns. The commencement of this reaction, and its progress to the point of ignition, is certainly a species of putrefaction; but we are ignorant what are the chemical changes which accompany it, and which make progress rapid enough to cause the mass to be heated to so high a degree. It is the same chemical action to which hay is often subject, when it is put into stacks before having been sufficiently cured; it is heated, exhales a peculiar odor, and would not be long without taking fire, if not opened and dried.

Organic matters when covered with water rot also, but in so doing, they present other phenomena than when they rot in the air. Very often the reaction commences by the production of microscopic animalcules, living and possessing powers of motion, which have received the name of *infusory animals*. At the beginning of putrefac-

tion, many generations of these animals succeed each other, die and disappear, whilst their elementary parts concur with, and aid the phenomena of putrefaction. The water acts by dissolving the soluble parts of organic matters, which are destroyed at the surface of the water by the action of the air, and which absorb the oxygen which the air yields to the water. In this manner, the insoluble parts are at first preserved from destruction, which cannot take place without the help of the air; but by degrees the dissolved bodies are decomposed, oxygen penetrates into the water, and the destruction spreads over the insoluble parts. But this reaction operates very slowly, and bodies amassed at the bottom of water so that the air cannot penetrate to them, can resist so well during thousands of years, that their origin may after that time be still recognized.

Mould [terreau.]

The vegetable matters which rot at the surface of the earth, finish by leaving a blackish brown pulverulent mass, which has received the name of *mould*, [humus.]

All the vegetation of a year, which dies at the arrival of winter, is converted by degrees to mould, which is mixed with the earth in which the plant grew: whence it comes that the extreme surface of the earth contains a greater or less proportion of mould, which serves for the nutriment of the succeeding growth of plants. This mould, such as it is found in the earth, is often mingled with the products of a less advanced putrefaction, or even with vegetable parts not changed, principally, a great quantity of small roots. If we examine the mould, such as it is found in cultivated soils, it is found to be in a mass very much mixed; but it is always possible to extract the parts which characterize mould.

During the transformation of the vegetable matters to mould, the first portion of their mass is changed into a brownish black substance, which presents all the characters of *apotheme*,* when we have separated from it the unaltered *extract*, which the *apotheme* draws with it. The salts of such acids as are of organic origin, contained in the vegetable matter, are destroyed, so that the elements of the acid are resolved into water and carbonic acid, whilst the base is combined with the substance analogous to *apotheme*, which makes part of the mould. The salts of acids of mineral origin are preserved, unless they are soluble, in which case the rain carries them off. In addition, mould contains a substance but slightly soluble in water, which colors the liquid yellow, and a carbonaceous substance which is entirely insoluble, and which appears to be one of the products of a destruction, still more advanced, of organic matters.

To give an example of a completed formation of a mould of vegetable origin, I shall here state the results of an analysis to which Bracannot submitted some wheat, which had remained during

many centuries in a damp vault, the issues from which were stopped up by earth, and of which the existence was forgotten, until by chance it was again discovered. The grains had preserved their form, and the brightness of their outside skin; but they were black, and were reduced by the slightest pressure to a black powder. The water with which they were boiled was colored yellow, and it left, after being evaporated, a saline mass of a brownish yellow, which burnt with slight explosion when heated, and which, besides the substance cited, soluble in water, contained nitrate of potash, nitrate of lime, and a little of the muriates of potash and of lime. The nitrates were the result of the oxydation of the nitrogen contained in the gluten and vegetable albumen, and of the combination of the nitric acid thus produced, with the bases previously combined with vegetable acids. The weight of this mass soluble in water, including the salts and all the other principles, did not exceed $1\frac{1}{2}$ per cent. of the weight of the black grain. When the part insoluble in water was boiled in alcohol, a small trace of a brown substance was taken up, which remained after evaporating the alcohol, and had the consistence of wax. The mass, exhausted of its soluble parts by boiling water and alcohol, was then heated slowly with a weak solution of caustic potash, which became saturated and colored of a blackish brown; and this treatment was continued as long as new potash lie took up any thing. This substance was precipitated from the solution by an acid: it was the body similar to *apotheme* which has already been mentioned, and of which the weight amounted to $26\frac{1}{2}$ per cent. The portion of matter insoluble in the alkali preserved the same appearance. This exposed to the action of diluted muriatic acid, yielded to it a certain quantity of lime, of oxide of iron, and of phosphate of lime. The residue was again acted on by potash, which took up a new and very large proportion of the body similar to *apotheme*. This was, after that, combined with lime, and resisted in that state the action of potash. This calcareous combination amounted to 42 hundredths. The 30 per cent. remaining consisted of a black carbonaceous matter, insoluble in the solvent used.

If cultivated soil is treated in the same manner, similar results will be obtained, with this difference, that the earthy matter of the soil is found mixed with the products which are obtained, whilst no soluble salts are met with, they being generally carried off by the rains.

To describe the constituent principles of mould, it is necessary to designate them by particular names. I will then call *extract of mould* the body soluble in water, and I will give the name of *geine** to the matter similar to *apotheme*, which constitutes the principal mass of mould. As to the coally substance insoluble in water, alcohol, acids and alkalis, I will designate it by the name of *carbonaceous mould*.

Extract of mould.

We obtain this substance by drawing it from the mould by the action of cold water, which becomes thereby colored yellow, and which leaves after evaporation, a yellow extract of a bitter taste, and from which some *geine* is separated when it

* What Berzelius calls *apotheme*, is "a deposit slightly soluble in water, produced in an aqueous solution of vegetable extract during slow evaporation, and containing a larger proportion of carbon, than does an equal weight of extract."

*Or *Albumin*, as termed by other authors.

is again acted on by water. If this solution is left to evaporate spontaneously, in contact with air, it becomes covered with an insoluble pellicle, and when a certain degree of concentration has been reached, the liquor becomes turbid. The solution is precipitated by the salts of tin and of lead: after the precipitation, the liquor is without color. According to Korte, the sulphuretted hydrogen gas precipitates it also. This extractive matter is contained in the water of many springs and streams. The water of the springs of Porla in Westrogotha, contains so great a quantity that it is colored yellow. When the iron contained in this water is oxydized from the air, the extract of mould is precipitated with the oxide of iron, and the water becomes clear.

Geine.

This substance has received different names. Bracannot has given to it the name of *ulmin*, for reasons which I have exhibited and opposed in a former part of this work. Dobereiner and Sprengel gave to it the name of *acid of humus*, because it combines with the earths and alkalis. But for the same reason we might give the name of *acid* to more than the half of all vegetable bodies.

Geine does not exist in vegetable earth only; root contains it also, and according to Bracannot, it is formed when the saw-dust of wood is exposed to the action of caustic potash. It is almost impossible to obtain geine in a state of purity. One part of the geine which is met with in a natural state, is in combination with bases; but when we attempt to remove these by an acid, the geine combines in part with the excess of acid, and acquires itself (in part) the property of reddening vegetable blues. Geine possesses all the properties of apotheme, and it is produced like other apothemes; that is to say, by the action of the air on dissolved extract of mould. In its natural state it does not act chemically, either like the acids or the alkalis, nor does it have any effect on the color of vegetable blues. It is but slightly soluble in water, which it colors of a pale yellow; is still less soluble in alcohol, and insoluble in ether. Exposed to the action of heat it takes fire, burns at first with flame, then without flame like spunk, spreading a peculiar odor, something like that of burning peat. Submitted to dry distillation, it is decomposed, gives half its weight of a charcoal having a metallic lustre, of empyreumatic oil, an acid water containing acetic acid and sometimes ammonia, some carburetted hydrogen, and a little carbonic acid gas. If geine is held suspended in water, through which a current of chlorine is passed, this whitens it, and precipitates a white resin-like substance. Iodine is without action on it. If we add an acid to an alkaline solution of geine, the geine is precipitated. If the whole of the geine is not precipitated, that part which is precipitated retains in combination a small portion of the base, and leaves, when it is burnt, a small quantity of alkaline ashes. If, on the contrary, an excess of acid is poured into the alkaline solution, the liquor is discolored, and the precipitated geine strongly reddens vegetable blues, a property which cannot be removed by placing the geine on a filter, and pouring water upon it. So long as the liquor which passes through the filter contains free acid, it is not colored; then it begins to be colored, and finally it dissolves as much as two-

thirds of its weight of the precipitated mass. These acid properties belong in part to the geine, which owes them to the action of the alkali, and which may, in this case, be called *geic acid*; they ought to be in part attributed to a combination of the geine with the precipitated acid. According to Einhoff, it is the latter case which is really presented, and the acid cannot be carried off, but with the aid of an alkali. Sprengel, on the other hand, pretends to have freed the geine, by prolonged washing, from the muriatic acid which had served to precipitate it: and to make certain the absence of the muriatic acid, he has mixed the washed geine with a little nitrate of silver. After evaporation to dryness, and calcination, the residue, treated by nitric acid, was dissolved, without leaving any muriate of silver. But as muriate of silver, like the other salts of silver, is reduced to a metallic state by bodies containing carbon and hydrogen, and carbon itself effects the same change when disengaged along with water, this result proves nothing. In general, in the descriptions of geine, they have attributed the properties of that which has been changed by the action of an alkali, to the geine which has not been altered. The geine which reddens vegetable blues, is the same, whatever may have been the acid which served for its precipitation. Its saturated aqueous solution is of a yellowish brown, and the combination is precipitated anew by acids, excepting the carbonic, and the sulphuretted hydrogen. Collected upon a filter, it is presented under the form of a gelatinous mass, of a taste slightly acid, astringent—and by drying, it contracts strongly, and forms clots of a deep brown, almost black, with a vitreous fracture, and which are not dissolved again in water after being once completely dried. The aqueous solution of the acid geine, is precipitated by the salts of lead, of tin, and of iron; but is not disturbed by gelatine, albumen, starch, gum, tannin, or solution of soap. According to Bracannot, it is precipitated by a mixture of the solution of gelatine and gallic acid. The dried geine is dissolved with difficulty, and incompletely, in alcohol. The solution reddens vegetable blues, whilst the part not dissolved is without this power, though it still preserves the property of combining with potash. Geine is destroyed by concentrated acids. The sulphuric acid dissolves it, taking at the same time a black color, carbonizing it, disengaging sulphurous acid gas, and leaving for residue the ordinary products which result from the action of this acid. By the addition of sur-oxide (or black oxide) of manganese, carbonic acid gas is disengaged. The nitric acid dissolves and decomposes geine, with a disengagement of nitric oxide gas, and carbonic acid gas. If the solution is evaporated to the consistence of sirop, and then mixed with water, there is precipitated a peculiar bitter substance in powder, and there are found in the solution, artificial tannin and oxalic acid.

Geine forms soluble combinations with alkalis. When an excess of geine is used, the caustic alkalis are so neutralized by this substance, that they lose their peculiar chemical action and properties. In this respect geine agrees with gluten, vegetable albumen, the brown of indigo, the sugar of liquorice, apotheme, and other bodies not acid. During the evaporation, the solution furnishes a black mass, which acquires lustre by complete drying, and splits, and is easily reduced to a powder. If

is re-dissolved in water, its taste is weak, bitter and disagreeable. Caustic ammonia gives a like mass, soluble in water, which gives up, during evaporation, the excess of alkali employed. Geine is not dissolved always in alkaline carbonates; when it is so dissolved, these carbonates are transformed, half into *geates*, half into bi-carbonates. When the solution is boiled, the bi-carbonate is decomposed with disengagement of carbonic acid gas, and in this manner the geine drives off all the carbonic acid. If a solution of geine in carbonate of ammonia, is evaporated, a residue is obtained containing neutralized geate of ammonia. The solution of geine in caustic potash in excess, absorbs oxygen from the air, and at the end of some time, the alkali is in part carbonated.

Geine forms with the *alkaline earths* pulverulent combinations but little soluble, which have an external resemblance to geine. The best means for obtaining them, is to mix a solution of the geate of ammonia, with the solution of an earthy salt; the combination of the geine with the earth is precipitated, and may be separated by filtration, from the supernatant fluid. In the humid state, these compounds are slightly soluble in water. According to the experiments of Sprengel, one part of geate of barytes is dissolved in 5200 parts of water, one part of geate of lime is soluble in 3000 parts of water, and one part of geate of magnesia, in 160 parts of water, cold. These same compounds require for their solution, rather smaller proportions of boiling water. After having been completely dried, they will no more dissolve. In the air, the base is combined in part with carbonic acid, and the carbonate which results therefrom, remains in the state of mixture with a combination of geine, and of a base analogous to a super-salt. The alkaline carbonates decompose the earthy geates; they dissolve the geine, and leave the base in the state of carbonate. According to Sprengel, the *geates of lime and magnesia* are dissolved in the caustic fixed alkalis, and in the carbonate of ammonia. Other chemists have not arrived at the same result; and according to them, the geate of potash, acted on by the hydrate of lime, precipitates all the geine. The *geate of alumina* is precipitated when a solution of alum is mixed with a solution of geate of potash, or of ammonia. This compound is dissolved in 4200 parts of cold water. In the moist state it is dissolved easily, and in abundance, in the alkaline carbonates and hydrates, and even in ammonia. According to Sprengel, it resists the decomposing action of acids, so that it is difficult to extract from it geine exempt from alumine. A combination is obtained having an excess of alumine, by digesting a solution of the geate of ammonia with hydrate of alumina.

Carbonaceous mould.

The substance to which this name has been given has been but little examined. It is insoluble in alkaline liquors. Its color is a brown, almost black. Placed in contact with a body in combustion, it takes fire, and burns without flame like spunk. According to the experiments of Th. de Saussure, carbonaceous mould combines with the oxygen of the air, and forms carbonic acid gas, and when it is left a long time exposed to air and water, it becomes by slow degrees soluble in alkalis. The acids precipitate it

from the alkaline solution, in the state of acid geine. When cold, the sulphuric acid has but little effect on it. According to Bracannot, the nitric acid converts it, at a gentle heat, to a brown liquor, in which water produces a precipitate of a chocolate color, which possesses the properties of acid geine, and is dissolved without residue, in the alkalis.

Soil [terre végétale.]

It is the mixture of these several substances with the upper layer of the surface of the earth, which constitutes the *vegetable earth*, or *soil*, properly so called. Arable land is a bed of this soil, placed upon a bed of earth which contains no mould. Its fertility depends upon the quantity of mould which it contains. Growing plants continually diminish the quantity of geine contained in the soil; and when the plants are carried off from the soil on which they grew, which happens almost always with cultivated land, it is finally exhausted to that degree as to produce nothing. It is on this account that it is necessary to manure land. The matters discharged and left by animals, or the barn-yard manure which is used for this purpose, are by degrees converted into geine, and thus replace the matters dissipated by vegetation. Botanists who have directed their attention to vegetable physiology, have remarked that the plants vegetate well enough without geine, until the time arrives for them to commence their sexual functions. But as soon as these are ended, and the fruit begins to be developed, the plants absorb a great quantity of the nutritive principles contained in the soil, and if these are not in the soil, the flower falls without forming any fruit. The experiments to which Th. de Saussure has submitted soil, [*terre végétale*] appear to demonstrate that the three constituent principles of mould, may be converted the one to the other, under the alternately preponderating influence of air and water. Water converts to the *extract of mould* a part of the insoluble geine contained in the soil, and this transformation extends more and more, so that finally the greater part of the geine becomes soluble. In contact with the air, the dissolved matter passes again to the state of geine. The *carbonaceous mould* which changes a part of the air into carbonic acid, is itself changed by air into geine, and into the *extract of mould*, and it is upon this transformation that appear to depend in part the advantages derived from the tillage of the soil, which is divided by the action of the plough, and exposed to the immediate influence of the air. In this manner all the parts of the soil contribute to nutrition; whilst it is probable that the solution of the *extract of mould*, that of the geate of lime, and perhaps also that of the geate of alumine, are immediately absorbed by the roots. During a heavy rain, this solution penetrates the interior, and often to very deep beds of the steril earth; but notwithstanding that, it is not lost to vegetable life: for the roots of trees seek it, and bring it back as matter suitable for their nourishment.

Experience has demonstrated that quicklime, and the carbonate of lime, mingled with the soil, favor the vegetation produced thereon. Chemistry has not yet explained, in a satisfactory manner, the power which lime thus exerts; however, it is known that when the soil contains this alkaline earth, or, in its place, ashes only, the mould is

quickly consumed, and vegetation becomes more rich in proportion. It has thence been concluded that lime acts, partly in exciting the plant to greater activity, and partly in rendering more soluble the principles of the soil, which are absorbed by the roots when dissolved in the water which the earth has imbibed. Lime is not then a true [or alimentary] manure. It contributes only to promote and hasten the absorption of the principles which serve to nourish the plant; and that lime may be serviceable, it is necessary to introduce into the soil, improved by lime, materials proper to furnish new quantities of mould. The lime, or the alkali contained in ashes, acts also in hastening the change of organic matters to mould.

It is known by experience, that gypsum also augments the fertility of the earth, especially when leguminous plants are cultivated. It is not probable that this neutral salt acts in the same manner as lime, and we are ignorant of what is its mode of acting.

Soil [*terre végétale*] possesses the property of being able to retain as much as three-fourths of its weight of water without appearing moist, and like charcoal, it condenses atmospheric humidity. It owes this property to the geine which it contains, which is one of the substances which, of all known, absorbs moisture with most energy. Mould [*terreau*] can absorb double its weight of water, without appearing moist; and after being dried, it draws from the air, in less than twenty-four hours, a quantity of water, which may vary according to the humidity of the atmosphere, from 80 to 100 per cent. of its weight. This property depends upon its light and dust-like consistence; and geine, of which the fracture becomes vitreous from its course of chemical treatment, is deprived of this physical property, which is of the utmost importance to vegetable life. For, in consequence of this property, mould retains water in the earth and obstructs its evaporation; and it is probably this water which maintains the extremities of the roots in the state to perform their functions.

It is usual to divide soil into fertile earth, and acid earth.* The first is very common—the second presents itself but rarely. It produces nothing, unless it be mosses: it is in marshy places that it is ordinarily found. It is in general composed in the same manner as fertile earth; but whilst in the latter the geine is united with lime, and perhaps with other bases besides, it is, in the acid earth, combined with acids, which, according to Einhof, are the phosphoric and acetic acids. It is for this reason that it has the property of reddening vegetable blues, and that it gives, by calcination, ashes which contain phosphoric acid. To dry distillation, it yields a great quantity of an acid liquid, containing the acetate of ammonia; and when it is distilled, after having mixed it with water, a liquid product is obtained which reddens

vegetable blues, and likewise contains acetate of ammonia. In opposition to Einhof, Sprengel affirms that the acid geine is produced only for the want of bases, and that its acid action proceeds only from the geic acid which it contains, and not from the presence of a foreign acid. De Pontin has made the analysis of an arid* soil taken from the plain of Eckerud in the government of Elfsburg in Sweden, and found that the geine had there combined with the malic, acetic, and phosphoric acids. The dissolving of the soluble principles of the soil in boiling water, left to be deposited, when the hydrate of lime was mixed therein, these acids as well as geine, so that there was found afterwards in the water only traces of the acetate and hydrate of lime. But when a current of carbonic acid gas was made to pass through this precipitate steeped in water, the geine remained, without dissolving, in combination with the carbonate of lime produced, while there was formed a solution slightly yellowish, which left, after evaporation, a residue of calcareous salts. This residue was treated by alcohol, which took up a certain quantity of acetate of lime, and left a salt of lime of a gummy appearance, which was soluble in water, and possessed the properties of the malate of lime. In burning the geate of lime, and taking up the residue by muriatic acid, there was obtained a solution which, when treated by ammonia, gave a small precipitate of phosphate of lime. The greater part of the acid geine was dissolved in the carbonate of ammonia. Hydrate of lime was poured into the solution, which precipitated the geine without leaving in solution a salt of lime. But when after having washed the precipitate, it was calcined, and the residue treated with muriatic acid, there was obtained a solution, which, after the expulsion of the carbonic acid, gave with ammonia an abundant precipitate of the phosphate of lime. These experiments confirm those given by Einhof.

An arid* soil becomes fertile when there is mixed with it lime, or ashes and earth, inasmuch as the soil consists principally of geine. The report of Sprengel, according to which, it [this character of soil] is produced in consequence of the absence of the bases which are found in fertile earth, is certainly true; but it does not follow from that, that it owes its acidity solely to the acid nature of the geine. The ashes of arid* soil always contain a great quantity of silica.

Products of putrefaction under water.

When fresh vegetable matters, not bruised or their thin texture broken, are plunged under water, they resist putrefaction for a long time. We have examples in stakes buried beneath the water, of

* It is not a little strange to say it is "*usual [dans l'usage]* to divide soils into fertile earth and acid earth," when the acid nature of any, has been treated by Berzelius as a new discovery, and of which the truth is not admitted by all of those who had taken the subject into consideration. If this division had indeed been usual, there would have been no want of numerous authorities (whatever might be their value) for the acidity of soil.

*This is still more strange, that so abrupt a transition should be made from *acid*, to *arid* soils—and in such manner as to induce the belief that the change was not owing to the author—but to an error of the press. But though this mistake would be as likely to occur in French as almost any other, (only one letter being different in the words *acide* and *aride*—) still it is difficult to believe that this same error should have been made and left to stand three times in this and the next page, where "*arid*" soils are named, and are marked * as above. The French translation is said to contain numerous typographical errors. I leave others to decide whether these are among the number or not.

sunken vessels, &c. which have been preserved for ages: also, buildings may be erected, without danger, upon a foundation formed of wooden piles driven deep enough to be covered by water: but these vegetable matters are constantly undergoing changes, and then destruction is only retarded. Every one knows that if, at the commencement of summer, a stick is thrust into the muddy bottom of a pond of stagnant water, bubbles of air are disengaged, and they even rise spontaneously at certain places; if collected, the bubbles are found to consist of carburetted hydrogen gas. They are disengaged from organic bodies placed at the bottom of the water or mingled with the earth below, which rot slowly, and are transformed to a kind of black vegetable earth, known under the name of mud or slime [*terre limaneuse* ou *limon*.] This earth is smooth and yielding to the touch, and when it is not mixed with foreign bodies, it is black. While drying, it contracts greatly, and almost always possesses the property of producing irritation on the skin, which is thereby covered with little red points; it is by reason of this property that this earth is used in many places to prepare the mud baths, [*limoneux*.] The constituent principles of mud are not sufficiently known, for them to be compared with the vegetable earth, or soil, produced in contact with the air.

Peat is another product of putrefaction under water. In certain marshy grounds, there is produced during summer a vegetation which, when it is ended, rots slowly in the water, and forms a bed of a carbonaceous mass, which augments gradually, so that the marsh becomes filled with a kind of soft mud, at the surface of which new growths of vegetation successively rise, and perish in their turn, and thus increase the deposit, until that at last the reservoir of water is completely filled with peat. In warm climates, where vegetation is abundant, and where, consequently, the mass of peat receives each year a more considerable augmentation, the formation of peat is carried on more rapidly; and in cold countries, on the contrary, this operation is more slow, and ages are necessary to produce an inconsiderable body of peat.* This substance has become very important because of its utility as fuel, and those who dig peat mosses gradually for the purpose of burning the peat, believe that forty years will be sufficient to fill again the empty places; but this expectation is not well founded: for it is in opposition to the observations made with the greatest care.

The constituent principles of peat are different salts accidentally dissolved in the muddy water, among which the sulphates of iron and of lime are often found, besides the peculiar combustible matter which constitutes the principal mass of

peat. It is black, sometimes of a blackish brown, and it contains, like mould, much water. By drying, peat contracts strongly, loses its coherence, and becomes very friable. Submitted to dry distillation, it yields (according to Bergama,) carbonic acid gas, and carburetted hydrogen gas, the weight of which amount to nearly 16 per cent. of that of the peat—25 per cent. of an empyreumatic acid water containing acetic acid, and sometimes ammonia—8 per cent. of oil *pyrogénée*—37 per cent. of carbon, and 12 per cent. of ashes. It has been found that these ashes contain no potash. Placed in contact with a body in combustion, peat burns without flame, like spunk, giving out a disagreeable smoke. It is insoluble in water: often it reddens litmus paper (vegetable blue.) Alkaline hydrates and carbonates dissolve it, commonly without leaving any other residue than the earthy substances which are mingled with it. This dissolving differs essentially from that of geine, in this, that when the alkaline liquor is concentrated, the substance of the peat swells up in it, and is changed to a gelatinous mass, which absorbs all the liquor. When afterwards this mass is mixed with hot water, it is resolved into a brown liquor which becomes gelatinous again, when concentrated by evaporation. This solution is precipitated by mineral acids, and the precipitate contains, in chemical combination, the acid employed: but, according to Brandes and Gruner, it is not precipitated by the acetic acid, even when it is applied in excess. If we evaporate to dryness the alkaline solution neutralized by acetic acid, and the residue is then treated by alcohol, this does not redissolve the acetate of potash, and the mass is no more soluble in water. Before the evaporation of the liquor, the hydrate of lime precipitates from it the substance of the peat; and if, after having burnt the precipitate, it is treated by muriatic acid, and ammonia is added to the solution, a little phosphate of lime is obtained. Einhoff has shown that the acidity of the substance of peat proceeds, the same as that of vegetable earth, as much from the acetic as from the phosphoric acid. Besides this particular substance, many kinds of peat contain some resin and wax, (which may be extracted by means of alcohol,) and vegetable parts not destroyed, which remain when the peat is dissolved in an alkali. The quantity of ashes which remains after the burning of the peat, varies from 8 and 10 per cent. of the weight of the dried peat, to 30 per cent. or more. These ashes are composed of silice, oxate of iron, phosphate of lime, alumine, and often sulphate of lime and sub-sulphate of iron.

DISCOVERY OF THE VALUE OF GYPSUM AS MANURE, AND INTRODUCTION OF ITS USE.

The first discovery of the utility of gypsum, for agricultural purposes, was made by a laborer, engaged in pounding plaster near Hilbrun, in Germany. He noticed the extra growth of the grass along the route which he at different times travelled, across a meadow: supposing it to be occasioned by the fine plaster dropped from his clothes, he was induced to try an experiment to determine the point; it succeeded beyond his expectation; and others tested its usefulness, until all became satisfied of its nutritious qualities; and thus the use of plaster in Germany, became general, as a manure, wherever it could be obtained.

* The author must be understood to speak of countries warm or cold in comparison with his own, Sweden; for as those terms would be used here, the facts are entirely opposed to the statement. Peat is only produced in those regions which are so cold, that all the growth of a summer cannot rot before it is increased by a second year's supply, and so the cover of peat is formed and keeps growing. In Virginia, there is no such formation, because the average heat of a year is always sufficient to decompose all the waste vegetable products of a year.—ED. FARM. REG.

In the year 1768, Jacob Barge, of Philadelphia, having learned the use of plaster in Germany, obtained some from a manufacturer of burr stones, and scattered it upon a field of clover, which proved perfectly satisfactory: in consequence of which, Messrs. Hocker, Lancaster, Clifford, and David Deshler, all respectable farmers near Philadelphia, used the plaster in various ways, and for different plants, and were all equally well satisfied of its utility. The call for, and application of, the article increased; and hence, the commencement of a regular trade, upon the seaboard, in the transportation of plaster from Nova Scotia, to all the southern ports; which has regularly increased, from that period to the present time; and which has become a business as regular and permanent as any other in the United States.

Extract from the Horticultural Register.

HORTICULTURAL NOTES.

On Acclimating the Chinese Mulberry—Flowers—Newfruits recommended for culture.

The acclimation of the *Morus multicaulis* or Chinese mulberry seems to be a subject that demands the attention of the horticulturist. From the accumulated evidence of planters in the Eastern States and the Middle States north of Long Island Sound, it appears that except upon very dry subsoils, it is liable to severe injury from the cold of our winters. In almost every instance in these limits the ends of the young branches which produce the finest and most succulent leaves are killed, and in many nearly the whole of the current year's wood is destroyed. As silk growers agree in the superiority of this species of *Morus* it is highly desirable that it should become more thoroughly naturalized among us. There are but two successful methods by which plants may be acclimated in general practice among cultivators:—continued reproduction from seed born in the new situation, and the disposition of the plants with regard to aspect.* The latter is generally successful only in the case of herbaceous plants and the smaller shrubs, so that it is to the former method we are to look in the case of a tree of so vigorous a growth as the Chinese mulberry. When we reflect that many of the most delicious fruits now abounding in our gardens were originally natives of the warmer temperatures of the Asiatic continent—the peach and apricot of Persia, and the cherry of Pontus, the climate of which have no season approaching in similitude our frigid winters—we may reasonably hope for like

*In the Farmer's Register for Dec., we presented a statement derived from the *Annales de l'Agriculture Francaise*, showing that it has been ascertained by experiments near Venice, that the Chinese mulberry (*Morus multicaulis*) cannot be continued by its seed, as it is a variety, produced as new kinds of apples and other fruits are by sowing, and that its seed will produce other varieties. The same kind must therefore be reproduced by cuttings, which fortunately grow well. Our translation of this notice has apparently not been seen by the intelligent writer of the piece above, though it was copied into many of the papers of the United States.—ED. FARM. REG.

success in a plant derived from China, so many of the vegetable productions of which withstand our season perfectly without protection. The fruits just mentioned have been reproduced to an almost endless extent from the seed, and the same gifts of nature which were once considered garden luxuries in Italy now flourish around the door of almost every farmer as far north as the Canadas. It is highly probable that our want of success in the field culture of the vine (which by comparative temperature should succeed perfectly any where in the Middle or Eastern States) may be solved by considering that in this country it has been propagated only by extension of the old plant; i. e. by cuttings and layers of the branches. The numberless varieties of the wine grape in Europe, many of which seem to be alone adapted to the vineyard to which they give celebrity, have been undoubtedly produced from seed. The *Morus multicaulis* bears seed at an early age, and in considerable quantity. It is highly probable therefore that the proper method to be taken to enable it to withstand our climate is to sow the seed ripened in this country successive for several generations of plants. In other words, the seeds of the seedling should be sown for a number of years and each crop, it is reasonable to suppose, will become more hardy than the former.

Almost every one derives gratification from the delightful fragrance of flowers. In fact many persons who are not admirers of beautiful colors and fine forms have a decided penchant for grateful smells. Such individuals will invest the grounds of the country villa or the garden of the cottage with an endless source of pleasure to themselves if they will take pains to assemble around them in their home situations the most fragrant flowering plants and shrubs. The porch of the cottage and the pillars of the piazza should be entwined and clustered round with the fragrant and beautiful honeysuckles. *Lonicera perychmenum*, the early fragrant, makes its appearance early in the spring and the monthly fragrant variety of the same plant continues to produce its delicious flowers during the whole season. A more recently introduced variety, *L. flexuosa*, the Chinese twining honeysuckle, also bears very fragrant and beautiful striped flowers, and retains most of its deep green foliage during the dreary months of winter. The taller growing varieties of the China rose—the Champney's and Noisette clusters, may also from their climbing habits and luxuriant growth, be easily trained in any such situation, and a slight protection will suffice to shelter them from the severity of our winters. The quantity of beautiful and fragrant flowers which will produce in a rich soil from June to November is astonishing. We have counted upwards of five hundred roses in bloom and in bud upon a single plant at one time.

But the most charming climbing plant with which we are acquainted is the *Clematis flammula*, or European Sweet Scented Virgin's Bower. It will in good situations reach the height of six or eight feet, and when in full blow in the month of August it literally fills the air with its delicious perfume. Among the first hardy plants which delight us by their pleasant odor in the spring are the Mezerium (*Daphne mezereum*) covered while yet leafless with delicate pink blossoms, and the fragrant European white and blue violets, which

are the violets of the poets; for though our woods abound in wild species, none of them unfortunately have any fragrance. It is the former that is so beautifully spoken of by Shakespeare, in the passage,

—"The sweet south
That breathes upon a bank of violets,
Stealing and giving odor."

The Lilly of the Valley and the Hyacinth are well known plants, deservedly favorites for their purity and fragrance. The White Lilly (*L. candidum*) still more popular, and the poet's *Narcissus*, the *Monarda*, with its mint-like smell, and the Rose-scented Chinese Pæonia (*P. fragrans*), together with the above, make a charming bouquet of sweets which it should be in the power of every one to gather who has a rood of ground to cultivate. Nor should the Evening Primrose (*Oenothera*) though the common, which disperses its balmy fragrance only in the evening, and the inconspicuous yet delicious *Mignonette*, be forgotten. The sweet scented shrub (*Calycanthus florida*) similar in odor to the pine-apple—the *Magnolia glauca*, the spicy smelling *Clethra*, the *Syringa*, and the fragrant yellow blossoming Currant of Missouri (*Ribes aureum*), all native shrubs of our own continent, have been long appreciated abroad for their elegant and odoriferous flowers. None of the above plants are rare; on the contrary they may all be easily procured, and the increase and dissemination of them around our houses of every description would tend to make the city residence more agreeable and the air of the country still more refreshing and delightful.

There are many fine fruits neglected or but little cultivated in this country, which are highly deserving of the notice of the horticulturist. The English Walnut, or as we term it, Maderia nut (*Juglans regia*), the fruit of which is annually imported and offered for sale in the shops, will thrive and bear abundant crops when in a genial situation south of 43° of latitude.* The fine appearance of the tree, added to its claims as an excellent fruit when ripe for the table, and in a green state for pickling, ought to recommend it universally to a place in the orchard or ornamental plantation. The Spanish chestnut, with fruit four times the size of our wild species, and the new varieties of filbert, bearing abundant crops of delicious fruit, only need to be better known to be sought after with avidity, as they (particularly the latter) thrive in our climate with very trifling care. The Black European Mulberry (*Morus nigra*) also grows well in a warm situation, and bears fruit of double the size and finer in flavor than the American.

In many situations in the Eastern States the common cranberry is produced in such profusion as to supply the wants of all the neighboring inhabitants; but in the other states and districts, less abounding with marshy and swampy land, its berries, so much esteemed for tarts, &c. are so rarely found growing wild as to be an article of luxury. In such situations it may be gratifying to some cultivators to know that they may be raised in the greatest abundance in any situation tolerably

marshy and wet, or where a moderate supply of water may be commanded. A few stakes should be driven in at the intended width of the bed to be made. Inside of these place some boards to hold the soil. Throw in to fill the bottom some small stones, and upon the top of them eight or ten inches of black bog earth, so that the lower three or four inches are immersed in the surrounding water. In this bed a few plants should be set, which will, in the same manner as the strawberry, soon cover the whole surface. The crops obtained will be both abundant and regular, and a small area will supply a large family.

A. J. DOWNING.

Botanic Garden and Nursery, Newburgh, near New-York.

[The following article which presents facts apparently opposed to the opinion that the Chinese Mulberry cannot be propagated by seeds, was received after the foregoing was in type.]

From the Genesee Farmer.

THE CHINESE MULBERRY. (*Morus multicaulis*.)

We have received a number of letters from our distant friends, inquiring for seeds of the Chinese Mulberry; and we state in reply that we are not aware that any are, or have been, for sale in this country. The difficulty of procuring these seeds from China, is mentioned in an article which may be found in the 43rd page of our current volume, copied from the Northampton Courier. It appears however, that some were obtained through the aid of an American missionary at Canton; and that the experiments of last summer in Massachusetts have fully proved that the leaves of these seedlings are as large, and the plants as vigorous and thrifty as those raised from cuttings or layers of the Chinese Mulberry.

This result is very satisfactory. In France, seeds bearing that name, said to be also from China, were sowed; but they produced other kinds, and it was therefore hastily inferred that *M. multicaulis* was not a distinct species. The seeds were evidently spurious. An editorial article in the last volume of the American Farmer says, "The writer of this, has gathered ripe fruit from a tree only thirteen months old; and has at this time a tree growing from seed ripened at that time." This is the only instance that has come to our knowledge of the Chinese Mulberry having produced good seed in the United States. We have a tree however, about eight feet high, which we intend to prune this spring with a special view to its producing seed.

But we would not intimate that this mode of propagating the tree will be preferable to layers or cuttings, except where we want to transmit the means of cultivating it, to distant places. It is very doubtful if seed will be of much account under any other circumstances. Gideon B. Smith, for many years editor of the American Farmer, says "This mulberry bears no fruit, or rather it is so minute, and so small in quantity, that the propagation of it from seed is seldom practised. But like all other vegetables of difficult propagation by seed, it is remarkably easy of reproduction by other means. By laying down the young trees, covering them with earth, and leaving the ends of

*A tree growing here which bears excellent fruit, now twenty years old, measures three feet in circumference at two feet from the ground.

the branches out, every branch will take root, and become a young tree—so that every tree one year old, will by proper management, produce from ten to twenty in one summer."

Last spring we set many cuttings, and though both the ground and the season were rather unfavorable, yet about one-half of them rooted; and one attained the height of three feet. We hope to be able in the coming season to give a better account of our operations in this line.

It appears from the American Farmer that "this mulberry was brought from the Philippine Islands by a French corvette, in July 1821. The corvette had been sent out by the French government, under the care of *Samuel Perottet*, for the express purpose of collecting rare plants, seeds, &c. along the coast of Asia as far as the Philippine Islands; and returned laden with them, the *Morus multicaulis* being one of the articles obtained. It was found at the Philippine Islands, whither it had been carried by the Chinese colonists, one of whom remarked that to this plant his country owed its immense product of silk." *M. Perottet* ascertained that it was originally from the north of China; and that it had been transplanted from Canton to Manila. On its arrival in France, it was immediately taken to the royal gardens at Paris and Montpellier for propagation and experiment, and the result has been its universal adoption so far as it could be obtained."

This mulberry is considered much superior to every other kind. It is said not only "to make silk of the best fibre," but it is also "most congenial to the constitutions of the worms;" and instances have been published of their promptly leaving the white Italian mulberry leaf for this sort. At the Brooklyn nursery indeed, their tastes were tried with six other kinds of mulberry leaves, but the worms gave the new Chinese a decided preference.

It has been repeatedly asserted by those who had the best means of knowing, that one pound of the leaves is nearly or quite equal in value to two pounds of the Italian mulberry, though we have seen a subsequent statement that reduced this difference. It is true that a large succulent leaf of the common kind is inferior in its quality to those of smaller size; but the objection does not apply to the Chinese Mulberry, for though its leaves are very large, they are remarkably thin and silky.

The facility with which the leaves may be gathered, is another important consideration. Their great size (often eight inches by ten,*) enables a person to collect an armful in a few minutes; and their low growth is particularly favorable for old people and children who can perform this labor without climbing. From all our observations we conclude that this mulberry has more the habit of a large shrub than a tree; at least it is much inclined to grow bushy; and by cutting it off near the ground, this disposition is much increased. It is doubtless from this circumstance, that it derives its specific name, *multicaulis* or many stalked.

There is one point of great importance however, which remains to be considered. The question is often asked, *Is this mulberry hardy?* and we are willing to answer with a slight exception, that it is so in the vicinity of our principal lakes. It is

true that the ends of the branches are killed every winter; but ours we think, have not been damaged in this way to a greater extent than ten or twelve inches; and when we consider that the tree continues to grow until it is nipt by the frost, it is just what we ought to expect. Wood that is immature and succulent as a weed, cannot resist a low temperature. All our native trees complete their vegetation in summer, in due time for the wood to harden and the buds to become perfect; but if by planting in a richer soil, we could prolong their growth till late in autumn, the ends of their branches would without doubt perish in the same manner. The poorer the ground, the sooner in the season the tree ceases to grow, and therefore this mulberry will be most likely to withstand the winter best on thin soils.

We consider the losses of these extremities however as a matter of small account, for it will rarely amount to one-fourth of the growth of one season; and as the trees become older, they will also become hardier. The current of the sap is diminished in velocity by being separated into so many branches; and as it consequently sooner ceases to flow in autumn, the wood has more time to harden.

In mountainous districts where the winters are severe, and where of course, a much greater part of the young shoot is killed by the cold—this mulberry we think, with a little management, may still be cultivated to advantage. The vigor of its vegetation will bear some proportion to the closeness of its pruning; and if most of the branches perish in winter, a luxuriant growth may be expected in summer from the old stool or stump. The leaves however, would come later than where they opened from buds ready formed; but this difficulty may be obviated in three ways: 1. Postpone the hatching of the silk worms by keeping the eggs in an ice-house. 2. Cultivate hardier kinds of mulberry for the spring supply. 3. Dry the leaves of the mulberry in autumn, to be used in the succeeding spring. A correspondent of the National Intelligencer says, "In the month of September Judge Bry of Louisiana, gathered a quantity of the best full grown leaves from the mulberry tree, taking care they should be free from dirt. They were carefully dried in the shade on linen and other cloth; and when perfectly so, were put into sacks, hung in an airy and dry place, until the proper season arrived for hatching the worm. When ready to use them, he pounded the leaves fine, and moistened them with steam—which upon experiment proved to be equally good, if not better nourishment, than the best young leaves."

We would remind our readers that three successive broods of the silk worm may be raised in one season; and that the constant and vigorous vegetation of the Chinese mulberry is admirably adapted to the support of the latter broods.

This mulberry from the great size of its leaves, is very ornamental; and we cannot conclude without strongly recommending to every freeholder who would embellish his door-yard, to procure a tree. The price will not exceed a few shillings.

* Some leaves have been measured that were 13 inches wide and 15 inches long.

From the Ohio Farmer.

SHEPARDIA, OR BUFFALO BERRY.

This interesting tree was discovered by Mr. Nuttall, in the vicinity of the Rocky Mountains, in the year 1810, and introduced by him into some of the gardens in the Atlantic States. It is perfectly hardy. In Winship's Nursery at Roxbury, in Massachusetts, it flourishes as well as in its native soil and climate, and during the last autumn his trees were literally loaded with fruit, which hangs in racemes of the size and appearance of red currants. The fruit ripens late in the fall. It is sub-acid and palatable in its natural state, and also makes an excellent preserve.

The tree belongs to the Linnæan class "Diacia," and it is said that it is necessary to place both barren and fertile plants in contiguity, in order, successfully, to raise the fruit—of this however, I have some doubts.

Gentlemen of taste could not expend a few dollars to better advantage in ornamenting their gardens, than by procuring several of those trees.

MISSOURI.

REMARKS ON THE AGRICULTURE OF RHODE ISLAND.

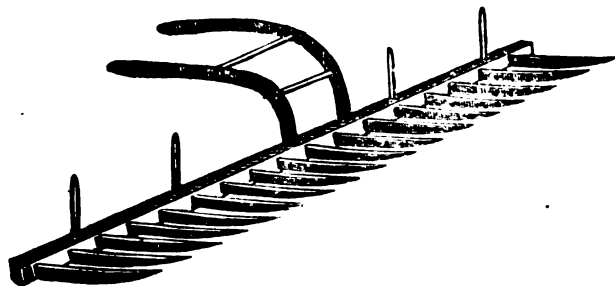
To the Editor of the Farmers' Register.

The following remarks upon the agriculture of Rhode Island, were made during a short visit of pleasure to the delightful summer retreat, Newport. They were made solely for individual gratification, and may be found scarcely worthy of a place in your Register. Observations upon the

habits and customs of a community differing essentially from our own, if they lead directly to nothing valuable, have at least a tendency to improvement. They beget a spirit of comparison: we are enabled to see how others execute the same, or nearly the same work, which we have been used to do in a different manner. Improvements are thus carried from one region of country to another with rapidity, which would have been years in finding their way in the gradual advancement of science. Peter the Great of Russia acted under these opinions, when he labored in the ship yards of England.

Our eastern brethren are a great way ahead of us in industry and skill in the labors of the farm. This is caused partly by the climate, which is cool and invigorating during the heats of summer, having by no means the same tendency to relax and enervate the animal system, that is experienced under the warmer sun of a more southern latitude, and partly by early habits of industry.

On the 20th of July, the crop of hay was not entirely secured, and it was said to have been much injured by fogs and wet weather, which had prevailed for some weeks. It accounted to me for the labors of harvest being continued on Sunday. I could not fail to remark the facility with which the grass was collected in wind-rows, by means of a horse rake. I am induced to believe that this rake could be beneficially used in gleaning our wheat fields, where the land is free from stumps and rocks, and where the grain is sowed broad-cast and level. With this impression, I will give a brief description of the implement, and subjoin a drawing of it.



It consists of a beam of sufficient size, say four inches square, and from nine to ten feet in length, into this beam, teeth twenty inches long are morticed, about three inches apart. These teeth are two and a half inches wide where they enter the beam, and curve on the lower side, being at the shoulders flush with the lower side of the beam. In the upper part of the beam, handles are fixed somewhat like those of a plough, except that they bend much more, so as to be conveniently held, as the rake is drawn with the teeth flat upon the ground, and going points foremost. On each side of these handles, which are in the centre, slender upright pieces are fixed in the beam about two feet high to retain the hay in the rake.

It is drawn by a horse, with long rope traces, fastened at each end of the rake, by means of an auger hole through which the rope is passed and knotted. When the rake is filled, it is elevated by the handles and the grass deposited at given spaces, in wind-rows. A boy rides the horse

to guide him properly, and another boy sometimes follows with a hand rake to collect small portions of the hay, which may accidentally be left; but where the implement is skillfully used, it gets the grass up perfectly clean.

I should think that one man and a small boy to direct the horse with this rake, would perform the work of ten men with the common hand rake. It is probable that this implement may have been in use in Virginia, but I do not remember to have seen it. I am convinced of its utility in collecting hay, and I should think it useful in gleaning fields of small grain where so much is left on the ground in our slovenly mode of harvesting. Palemon would here have no occasion to direct his laborers to leave something for the "lovely young Lavinia."

I doubt if any portion of Europe can be found more highly cultivated than this island, if we except the immediate vicinity of London, and some part of Tuscany. Every where the earth is made useful. The fields are small, containing from five

to fifteen acres, all rectilinear, and for the most part enclosed by stone walls; sometimes planks and post and rails.

The crops cultivated are grass, corn, potatoes, onions, rye and oats—the largest portion being in grass, the next largest in corn, potatoes, &c. I can give you no better idea of the high cultivation and consequent value of the soil, than by stating the prices of land in rent and in fee.

A gentleman has within a short time, purchased about forty acres of land near the town of Newport, for which he gave five hundred dollars per acre—the buildings upon this land were very ordinary, and could not have been estimated at more than 1500 dollars. The common annual rent of land, from all I could learn, varied from three to ten dollars per acre. Lands adapted to the growth of the onion rented highest, that crop yielding a greater profit to the acre than any other. It will at once be supposed that lands that sell and rent at these prices are not permitted to lie idle: they are all under the plough, or mowed for hay. No fields are seen covered with rank luxuriant and pestilential weeds: the seeds of these plants which so much abound with us, and are even valued as returning vegetable matter to the soil, seem here to be extirpated by cultivation carefully conducted through a series of years.

It surprised me, that under this aspect of the country, I seldom found persons actually laboring in the fields. It seemed as if some friendly fairy did the work by star light. This is to be accounted for, however, by the energy with which they work when actually engaged. They do not stop to gaze at you as you pass by, and if you enter their fields and talk to them, they converse with politeness, but do not cease to labor. I should think that one Rhode Island laborer would perform as much work as two and a half of the southern slaves.

Corn is here planted about the 10th of May. From three to five stalks are permitted to grow in a hill, distant from each other two feet one way, and three and a half the other. It produces about fifty bushels to the acre. They plough their corn three times, and work it after each ploughing with the hoes, the earth being drawn up to the stalks very high. They give this hill to prevent the corn from being prostrated by the wind, and consider it more necessary to cultivate this small species of corn with a hill, than the larger southern corn, in consequence of the size of the stalk.

Grass is produced at the rate of from two to three tons to the acre, for which they receive at market from seventy-five cents to one dollar per hundred weight. I was particular in the inquiries I made in relation to the effect produced by the application of marine weeds as manure, which I have observed to be applied on this island, as a top dressing to grass lands. These grasses are probably loosed from the rocks, and the bottom of the sea, by the percussion of the waves; and in particular seasons, when the wind blows in shore, they are collected in large quantities upon the beach, from which they are carefully hauled as manure, and applied to most of their crops with great benefit, particularly to potatoes, corn and grass. Upon the latter they usually put four ox-cart loads to the acre, which are equal to six loads, drawn by our oxen in eastern Virginia. This quantity, when thinly spread, covered the ground,

and produced the most beneficial effects. Lands that yielded eight hundred weight of grass to the acre, in an undressed state, would produce as much as two tons if dressed in this way. The grasses used in the greatest quantities, are vulgarly known by the name of *rock weed* and *ribbon grass*. The former is a narrow leaved plant with many joints, at which a number of small roots shoot, resembling very much in appearance our wire grass, which if I mistake not is the *florin grass* of Ireland. The latter is a large and long leaf, not unlike in shape, a corn blade severed in the middle, but very thick, and covered with a fine polish as if it was varnished. It derives its name doubtless, from its resemblance to *ribbon*. This grass may be found in considerable quantities in the rocks on the sea shore, floating in situations where I have fished for the black fish.

The farmers preferred these marine manures to the best stable manure, or the dung of animals—their effects of course being greater. In addition to these marine manures of vegetable basis, they use great quantities of fish called *menhaden*, which are taken in large numbers by fishermen, whose business it is to look out for them on the sea shore. When a shoal of them appears, a boat loaded with the rope of one end of the net, and the seine, goes out beyond the fish, and the fishermen throw out the net, so as to encompass them: another boat attends with the rope, to attach it to the other end of the seine, and thus it is drawn to the shore. These fish are very fat; and seemed to be the same fish known to us, by the name of *ale wife* or *old wife*. They are purchased on the shore at 17 cents a barrel, and applied to the land as a top dressing for grass, and I believe sometimes ploughed under. The land thus dressed produces grass of a superior quality, and to use an expression of a farmer 'it makes it *graze sweet*,' stock of all kinds preferring the spots thus dressed to any other part of the field.

The only unpleasant consequence of this sort of manuring is, that the nostrils of the visitor are assailed frequently in his walks by an odor, to which real *eau de cologne* is, somewhat more agreeable.

The facts here stated, the writer received from the laborers themselves, with many of whom he was in the habit of daily conversation, and who were practically acquainted with every thing appertinent to their vocation. I will here take occasion to remark, that these eastern men, are remarkable for the extent and accuracy of their information in relation to the business, in which they are engaged; all the powers of their minds, sharpened as the intellects are by interest, are brought to concentrate their force upon a single point.

The space I have already occupied, admonishes me to conclude.

—————In publica commoda peccem,
Si longo sermone morer.—————

C.

Richmond Co., Feb. 7th, 1835.

From Martin's History of the British Colonies.

STRANGLING HORSES.

Travelling over frozen rivers or lakes is however, not unattended with real danger; the sleigh, in

horses and passengers, being not unfrequently instantly engulfed, and sucked beneath the ice, there being no warning of the danger until the horses sink, dragging the carriage and its inmates after them. In general, it is fortunate the weak or thin places are of no great extent; and when the horses are found to be sinking, the passengers instantly leap out on the strong ice, seize the ropes which, with a running noose, are placed ready for such an emergency on every sleigh-horse's neck, and, by sheer pulling, the animal is *strangled in order to save his life!* This is absolutely a fact. If the horse be allowed to kick and struggle, it only serves to injure and sink him; as soon, however, as the noose is drawn tight, his breathing is momentarily checked, strangulation takes place, the animal becomes motionless, rises to the surface, floats on one side, and is then drawn out on the *strong ice*, when the noose being loosened, respiration recommences, and the horse is on his feet carrying away again in a few minutes as well as ever. This singular and almost incredible operation has been known to be performed two or three times a day on the same horse; and the Americans say that, like Irishmen, the animals are so used to being hanged that they think nothing about it. Often, however, horses sleigh or carriage, and passengers, are in a moment sunk and swept beneath the ice. The traveller on the frozen rivers, but more especially on the frozen lakes, incurs also great danger from the large cracks or openings which run from one side of the lake to the other, from one to six feet broad, causing, at some distance from the crack, a shelving up of the ice to the height of several feet in proportion to the breadth of the fissure. The sleigh drivers, when they see no other chance of passing or of escape, make the horses endeavor to leap the chink at full gallop, with the sleigh behind them, at the imminent risk of being engulfed in the lake.

INCREASE OF TRANSPORTION ON THE CHARLESTON RAIL ROAD.

The Charleston (S. C.) Patriot of the 4th inst. publishes a correlative view of the receipts of this road for the first three months of the years 1834 and 1835, which presents the following result:

	1834	1835
January,	\$4,229	\$13,290
February,	8,174	14,875
March,	11,988	17,459
	<u>\$24,391</u>	<u>\$45,624</u>

Showing that the receipts of the present year are nearly double what they were in the correspondent period of the year 1834. This is exclusive of the amount received for carrying the mails. The same paper further states, that the number of passengers (exclusive of those in the company's service) from the 1st of April 1834 to the 1st of April 1835, has been twenty-nine thousand two hundred and forty eight—and that on the 2d inst. 141 passengers went up in the steam car William Aiken, yielding \$607 88.

"This increased business on the road has greatly exceeded the most sanguine expectations of its projectors, and furnishes the best criterion of its prosperity. It has been found so highly beneficial in extending the business of Charleston, that the

power on the rail road is at present inadequate for the trade and transportation on it, and the directors have therefore determined to increase it greatly beyond its present amount, by the commencement of the fall business."

ON THE DIFFERENT EFFECTS OF BURNING, AND PLOUGHING IN, ROUGH VEGETABLE MATTER.

To the Editor of the Farmers' Register.

A correspondent in your February No. page 577, very properly comments on the advantage and propriety of every writer for your paper signing his *proper name*, to all communications, stating facts in agriculture. His remarks are sound, and well expressed. We cannot all write either with elegance or learning. But, there are few farmers that are subscribers to the Register, who are unable to express the results of their experience, in "brief and good phrase." Numbers have already attempted it, under their own signatures, with complete success, and beneficially, to the community. We ought all to be aware that your work is not intended for the display of fine writing or book learning; and, whoever writes for it, should make his style as plain as he can, avoiding *technicalities*, when it can be done, as well as quotations from the foreign or dead languages. These are but evidences of pedantry, at best, when there is a corresponding expression in our own tongue. The sciences, connected with agriculture, have peculiar *terms* that cannot be well dropped; but, wherever it is possible, the common parlance mode of conveying the same idea ought to be employed also, that every class of readers may get the meaning with the least trouble.

The correspondent alluded to, *Peter De Quir*, ought to have *practised* on his own rule. He adds a P. S. to his letter, and asks the following questions, to be answered, either by the editor, or some of his friends:

"Is it ever advantageous or proper to burn land? Is there any kind of vegetation which grows in our fields, that it would be more profitable to burn off than plough under? Will the ashes produced thereby, compensate for the loss of vegetable matter? Will not the crop be better the first year when coarse grass or broom sedge is burnt, than it would be, if ploughed in? But will not the land be ultimately benefited in a greater degree by turning in such a cover?"

Many years' observation on the subject of these questions has enabled me to form an opinion on them, which I think is not essentially different from the opinions of most practical farmers. That opinion, however, is at the service of P. D. Q. and others, who have doubts on so plain a subject.

There are very few circumstances that can justify burning. With some men, who use small ploughs, and advocate shallow ploughing, it is a custom to burn the dead vegetable matter on their fields, when it is the least in the way of their ploughs, and particularly for corn and oats. I have endeavored to reason several out of the practice; but was actually laughed at by them, as a theorist. I have noticed, that, if the dead matter be so thick as to impede the perfect operation of ploughing it *under*, the after tillage, if corn be the crop, is more difficult; and when the covering

broom sedge or very coarse grass, the first crop is apt to suffer, from the ground not being properly pulverized in time. If the crop be wheat or rye, it is greatly helped by turning in any sort of cover. Grasses and weeds with their roots and sods are frequently gathered into piles by the harrow, after bad ploughing; yet, upon these very spots the crop is almost always more luxuriant and productive—showing, plainly, the advantage of the vegetable matter thus gathered together.

After any heavy covering is ploughed under, which is more easily done with the help of a weighty chain, the harrow should follow while the ground is mellow, and then the roller. The harrow fills up all the cracks and breaks left by the plough, levels and pulverizes the soil; the roller mashes it down and presses the layer of vegetable matter into a small compass. When thus treated, fermentation and decomposition follow as soon as enough heat and moisture are supplied by the seasons. Whatever is thus turned under in the fall or winter, will be found mouldy and tender in the spring, and soon becomes food for plants. Broom-sedge is the most difficult to make rot; but even that rots time enough to benefit wheat. If the unavoidable openings and seams left by the plough be not filled up and pressed down, fermentation will not take place soon enough, in consequence of a too free circulation of air: and the soil on top, not coming near enough to the earth below, is apt the sooner to suffer from drought. But these things are too plain to occupy more time in explaining.

Some of the largest corn crops ever produced in the United States, were made on land, in good heart, that was covered over with a thick sod and coat of vegetable matter. It was well manured, broad cast; whirled completely over, harrowed and pressed down with the roller. But the after tillage was not more than three inches deep; neither breaking nor turning up the sod again. I am inclined to think that all vegetable matter put below the operation of tillage and pressed down, must greatly improve the land, and if not disturbed, enlarge the crop growing, during the process of decomposition. The stratum will not be thick: it freely admits and retains moisture, and as soon as the mould commences to rot, supplies abundant food to the roots that are spreading out in every direction in search of food.

The tobacco planter's mode of cleaning new ground, by raking up the leaves and trash and half decayed vegetable matter, and then burning it all, is a wasteful operation. These materials, if spread on exhausted spots in the fields, and ploughed in, would impart life enough to throw up such a crop of rye, or oats and clover, as to make it easy afterwards to restore them to their original fertility. The use of wheat straw, chaff, or leaves will result in the same benefit. It is contended by some of the best farmers, that top dressings of straw and chaff is the best mode of using them for improving land.

He that advocates burning, will be convinced of its rapidly impoverishing effects, by taking an acre of his best soil, cultivating it in his usual way—carrying off all the crop, and after small grain, burning off the stubble, and then the grass in the fall and burning the grass also in the fall, after corn. This process will entirely exhaust the vegetable matter in the soil, and render it literally sterile.

Those crops have been considered the most improving which either leave the most on the ground, or add most to the manure heap. In the culture of tobacco, all other vegetation is kept entirely down quite until frost, and all the crop, save the root and a short end of the stalk, is carried off. The renovating nature of the clover crop is mostly owing to the tap root of the plant being so large and long, keeping the land light and divided, and its yielding such a heavy coat of vegetable matter. It throws up successive crops of spires and leaves in the same season—the earlier constantly falling and decaying amid the springing verdure of the younger growth, until frost chills all vegetable life. Below the mountains the heat of summer matures the greater part of the first crop, and dries up that as well as the younger shoots. But as soon as “the dogs days” are gone, the verdure starts again. Whoever examines a field that has stood in clover, will find it covered with a black fertilizing dust or mould, more or less perceptible, as the rains have been light or heavy. Such of it as has become decomposed is apt to be partly solved by rains, and the whole to be partly mingled with the top soil. From its tender succulent nature, clover rots sooner than weeds or grass, and becomes nutritive to plants. But the same process takes place, and for the same wise purpose of nature, with every species of vegetation, from the majestic forest tree down to hair-like hen's grass—converting all into fertilizing matter. The ratio of their value is probably unknown to the most skilful in the science of chemical analysis. But I did not take up my pen to write an essay on manures.

That ashes are stimulating to plants, or rather, aid in the process of feeding them, is well known, and they are highly valued by every good husbandman. But I have never seen any vegetable growing in pure ashes, and infer that their action is in combination with earth and putrescent matter. The quantity of ashes left on land after burning, is so small, compared with the quantity of unquestionable food for plants that would be created by the decomposition of the same covering, that the loss by burning must be manifest. Let any one burn a portion of hay, straw, grass, or weeds in such a way as to save all the ashes. He will be surprised at the smallness of the quantity. Let him spread it on a plot of ground, and then spread the same weight of the material burnt, on another plot of the same size, and either plough in or not. The mere contemplation of what would be the result, it seems to me, will decide the question. If not, I am egregiously mistaken in my notions, and ashes are worth more than their weight in silver!

It is sometimes necessary and “advantageous” to burn meadows when they begin to be overrun with broomsedge; for the three-fold purpose of destroying the seeds of the sedge—giving the grass a chance to rise and cover the ground in the spring before the later growth of sedge puts up—and enabling the mower to cut the grass clean. When it is not convenient to plough up and re-seed the meadow, burning will make it hold out against the encroachments of wild growth two years, and sometimes more, beyond the time at which, without burning, the hay would hardly be worth cutting.

Wire grass and its roots should always be burnt; and so ought thistles. Fire is the surest destroyer

of these pests. Briers are easily cut down with knives made for the purpose, and they form a valuable covering over galled spots, or add to the manure bank. When not in patches the plough sufficiently masters them. Annual burning tends to impoverish and harden the soil of even the richest wood land.

I have, Mr. Editor, in a lame, and I fear, tedious manner, endeavored to answer your correspondent, *Peter De Quir*. Since he did not act on his own recommendation to others, he cannot complain that his queries have not been responded to *in propria nomine*. But, if he does, he has only to adopt the Arabic mode, and read backwards.

RIVQEDRETEP.

REMARKS ON THE PAPERS CONTAINED IN NO. 9 OF THE FARMERS' REGISTER.

To the Editor of the Farmers' Register.

Presuming that the chief motive of all who write for your paper, is, a sincere desire to benefit the cause of agriculture, I shall take it for granted that none will be displeased by the expression of any doubts or objections to which their communications may give rise—provided there be nothing blameable in the temper or manner of doing it. Nearly as much good may sometimes be done in this way, as in any other.

Influenced by this belief, I shall proceed without farther preface, to offer such remarks as have suggested themselves to my mind in perusing your February No. They will be presented without connection, and without regarding any thing but the order in which the several articles commented upon, follow each other in your paper.

What is meant by the terms—"brakes" and "peat-moss" in Mr. James Hale's premium dissertation? The first is a provincialism not understood in middle Virginia, and the second is not generally believed to exist in the United States—if what is so called in England, Scotland, and Ireland can be found in them at all.

Mr. Hale's plan for collecting and making manure by "a compost heap," I like much, saving the location which he recommends; since I am perfectly sure that no farmer with a Virginia-nose could possibly be prevailed upon to concoct such "a rank compound of villainous smells," (as Falstaff said by the buck basket,)—"not far distant from the back part of his house."

Is it a fact so well established as to justify his unqualified assertion of it, that "farm-yard manure" should be suffered to remain from spring and summer, "till the next fall, when, together with the dung and urine of cattle, with which it is mixed, it makes an excellent manure, and should be carted out and laid in large heaps, for the purpose of being placed in the hills of Indian corn or potatoes the ensuing spring?" Is it another fact also so indisputably settled as to require no proof, that, "stable-dung and animal manure ought to be spread on tillage-land designed for corn or potatoes the spring after it is made, and well mixed with the soil by the harrow first, and then the plough?" Has he ever made fair comparative trials of any different plan, or seen others make them, where the manure was applied on the surface, and in a much fresher state? If he has not, can he be called a competent judge?

With Galen's communication, I was, upon the whole, much pleased; although I must say, that he delivers his opinions—however important the subject, rather too abruptly. For instance, he asserts—without the slightest doubt or qualification, that, as to plants, "the earths afford no real nourishment themselves, but act entirely as exciting agents." Now, do not all agriculturists admit that there is such a thing as *the food of plants*, and that it is supplied either by *the earths*, or *by water*, or *by both*? Will they not also admit, that "exciting agents" cannot, with any propriety, be called suppliers of food? Where then is Galen's authority for assuming *that* as a fact universally admitted, in support of which, he offers nothing, but his *ipse dixit*? His concluding sentence furnishes another instance of a highly important assertion, entirely without qualification, or illustrative argument to sustain it. I subjoin his own words: "There is a wonderful similarity between the vegetable and animal world; they are both governed by the same laws—the various agents that act upon them are similar," (to both these assertions there are numerous and striking exceptions,)—"their organization in many respects the same, and they both possess motion, sensation, and life." This last assertion also, is much too broad; for, not to cavil at the term, "possess motion," instead of the power of motion, the motion and sensation ascribed to vegetables are as really unlike the motion and sensation of animals, as any two things can possibly be, between which any sort of resemblance has been supposed to exist. Such fanciful analogies may do very well as ornaments of style, but not for scientific agriculture.

Your correspondent N. E. Read, in his valuable communication, has stated many interesting facts. Few of your friends, probably, have furnished more within the same compass. His general remarks, before he comes to specifications, are particularly good. As to his "new method of preserving sweet potatoes," I have no doubt of it being good; but if an old, a cheaper, and safer mode will answer perfectly as well, why change it? Such a method has been followed in my part of the country, as far back as I can remember, and has been practised with entire success. It is to put them away in dry sand—as I see also recommended in your February No. Thus preserved, I have often eat them late in April perfectly sound; and this mode has the advantage over Mr. Read's in keeping the roots under lock and key, in a cellar, where they are safe from the depredations of our slaves, who have quite as "sweet a tooth" for sweet potatoes as we ourselves have.

Of his plan for preserving dried peaches, apples, &c., I can say, *probatum est*.

His remarks headed "Tar, Pine-tree, wood for fuel," appear to me of so much value, that I should rejoice to see them in some of our newspapers—taking place of the miserable party politics with which they are so incessantly gorging and disgusting all true, honest lovers of their country, all who really prefer its peace, harmony, and happiness to all other political considerations whatever. As fire dispels noxious and fetid miasmata from the natural atmosphere, so might such publications—treating as the latter part of Mr. Read's does, of a most important branch of rural economy—dispel from our political party-papers, by their

occasional insertion, all those putrid exhalations from corrupt sources which are so constantly contributing to render our political atmosphere poisonous to the moral health of all who voluntarily inhale it.

Dr. R. R. Barton's remarks on the neglect of agricultural education are perfectly just and true. If agriculturists in our own state would only regard them as they ought, a very few years would suffice to give our good old Mother Virginia an entirely new—rich, and most beautiful suit of clothes, instead of the rags that her sons now keep her in, until many of them get so ashamed of her, as to run away in search of some new foster-parent, to be treated probably in the same way. Pattern and experimental farms, connected with schools and colleges on the manual labor system, would indeed be a reform of infinitely more importance to our national welfare, than all which our political parties put together seem ever likely to accomplish towards its achievement.

The extracts from the Complete Grazier are very interesting in themselves; but before we self-satisfied farmers of Virginia can derive much practical benefit from them, we must become a little more anxious to convert our hereditary broom-straw old fields into rich pastures; and a little less dependent upon the hides of our winter and spring-starved cattle for leather to make our negroes' shoes.

Horizontal ploughing was practised, to my certain knowledge, in the county of Essex, Virginia, nearly or quite half a century ago, by a Mr. Spindle, and some few of his neighbors. Still Mr. Thomas M. Randolph was the first, I believe, to make any publication about it, and with him probably the plan was original, as well as it had been with Mr. Spindle. This kind of ploughing, however, unless very accurately performed, and unless the land be also coultured as deep as practicable, with a single coultor or substratum plough, is but a very partial remedy, (if it be one at all,) for the evil it is designed to prevent. By the way, it has given rise in some "benighted corners" of our good old state, (for she also has a few such places,) to the practice of "laying off" our dead levels with the same crooked furrows that we "lay off" our hills, under the very sagacious and mathematical calculation, that, because one crooked row between any two points is certainly longer than a straight one would be between the same two points, therefore, the whole level thus laid off must contain more corn hills! Ye who govern yourselves by the dogma—"nil admirari," keep from stretching your eyes at this fact—if you can!

As to the causes of rust, smut, and other diseases in wheat, corn, &c., the dissertations on them, of which A. N.'s. is as good as any, and of which I believe that I have read some hundreds, have always seemed—to say the least of them—very useless speculations, unless accompanied by some remedy. Indeed, in regard to several of the diseases treated of, the investigation of their causes, even when deemed successful, has appeared quite as profitless as would be a demonstration of the causes of dry and wet weather. No cure, as far

as I recollect, has ever been found for any of these diseases, any more than for too much drought, or too much rain. The smut, perhaps, is an exception. But be it remembered, that burning and liming was ascertained to be a preventative long, long before any person so much as even dreamed of the wonders said to have been performed by Mr. Francis Bauer with his smut-balls; and in regard to which, I shall take the liberty, at least to suspend my opinion, until farther evidence be exhibited.

Far be it from me altogether to deny the use of such investigations; for I know well that diseases both in the animal and vegetable kingdoms are not to be cured, unless by accident, without a previous knowledge of their causes. But I would have such researches after the origin of these diseases more frequently accompanied than they are, by details of apparently successful attempts to cure them. It is chiefly owing to the want of the latter, that "book-farming," (as it is often scoffingly called,) is in such bad odor with thousands of agriculturists, who cannot be persuaded that it is any thing better than mere speculation. Read to them as many as you please of such achievements as Mr. Bauer's, and such dissertations as treat solely of such matters as the origin of those diseases which often destroy our crops, and they are ready with Sancho Panza's answer to his master Don Quixote, who, after Sancho's drubbing at the celebrated braying adventure, undertook to explain to him very learnedly, why it was that he felt so grievously sore. The squire's reply was;—"Before God, your worship has brought me out of a grand doubt, and explained it in very fine terms. Body 'o me! was the cause of my pain so hid, that it was necessary to tell me, that I felt pain in all those parts, which the pole reached? If my ankles ached, you might not, perhaps, so easily guess why they pained me: but to divine, that I am pained because beaten, is no great matter."

Friend Jeremiah's association of "hogs, legislators, and manure making," seems, to say the least of it, a very queer one. Has he ranked them according to his scale of merit, or is the climax accidental? This is a question I should like him to answer, for verily I suspect him in these plotting times, of some insidious designs against the honor and dignity of our legislative bodies—either state or federal.* His Jeremiads about "stump and barrel love of country," and "stump and barrel legislators," chime in with my notions on these subjects so marvellously well, that I should like to have some more of them. I have always considered such things full as great enemies to good legislation, as cut-worms, chinch-bugs, and Hessian flies are to good crops.

Shenstone, in my humble opinion, is more "equal to the task" to which he seems to think himself inadequate, than he supposes. For one, therefore, I should like to hear more from him.

*As our correspondent Jeremiah has been thus called on to explain or defend the title to his communication, it is proper to state, that the offence was not his, but ours'. His communication had no heading—and, as in all similar cases of omission, we attached such as seemed suitable.—ED. FARM. REG.

To X. Y. Z. I beg leave to extend the friendly hand of a fellow sufferer. Our feelings and opinions about "the fence tax" correspond perfectly. But I would earnestly recommend to him and all others entertaining similar opinions, not to consume any more time, paper and ink, in writing on the subject, either in your paper, or elsewhere—at least until they try every effort to procure a majority of legislators, who not only understand the interests of husbandry better, but have a much stronger regard for them, than has ever yet been manifested by any heretofore chosen. The truth is, that these interests are either not thought of at all, or always postponed as matters of very subordinate concern, and so they are likely to be forever, unless we cease to make a man's party politics the first requisite for legislation.

The article on Merino sheep, places those animals in their proper rank. It is a great pity but our countrymen in general had thought as the writer does, before the mania on that subject seized them some twenty odd years ago. Many a poor fellow would have his money by it, instead of being gulled out of it to the tune of thousands upon thousands, by certain gentlemen who were selling off their rams almost as fast as they could be delivered, at a thousand, twelve hundred, and fifteen hundred dollars apiece! But "to play the fool sometimes" seems to be a necessary evil, to nations as well as to individuals.

The above notices are sent by way of experiment to ascertain how you and your various correspondents may like such liberties being taken with their communications, by one who is perfectly willing that still greater should be taken with his. A single hint will suffice hereafter to silence forever—at least in this way—your friend and constant reader

COMMENTATOR.

BOTANICAL DESCRIPTION OF BROOM GRASSES, AND OF PINES.

To the Editor of the Farmers' Register.

The genus *Andropogon* includes those plants which, in the southern states are known under the name of "Broom-grass." The most common species, according to Mr. Elliott, is the *A. dissitiflorus*, (Mich.) or slender spiked *Andropogon*—spikes solitary, conjugate, as long as the sheaths; flowers by pairs, the hermaphrodite awned; with the awn straight, scabrous, caducous. Stem erect, three feet high, branching, with the branches appressed; leaves long, linear, scabrous; sheath contracted and hairy at the throat. Spikes hairy—grows in close soils—flowers in October.

Another common species in our fields is the *A. scoparius*, of Michaux. Spikes simple, on peduncles, by pairs, forming straight panicles; flowers by pairs, the hermaphrodite sessile, awned; the neuter on a footstalk awned; the rachis ciliate. Stem herbaceous, three feet high, very glabrous, slightly compressed, furrowed on one side, tinged with purple, grows in dry poor soils, very common.

Your "woods broom straw", may be *A. macrourus* of Michaux. Panicle clustered, spikes conjugate, clustered, stem three or four feet high, slight-

ly compressed; flowers in clustered panicles, terminal and lateral, but generally near the summit of the stem—flowers in October.

Cluster flowered broom grass. A variety of this has its leaves very glabrous and glaucous—grows in damp soils.

Andropogon argenteus, (white spiked broom grass.) Spikes conjugate, longer than the sheath, clothed with white, silvery hairs. Stem three feet high, branching from the base, very glabrous, tinged with purple: grows in dry soils—flowers in October.

The species of the genus in this section, form a very natural family and are not easily distinguished; they cover our poor pastures in the fall and winter with their coarse, dry foliage, and are known by the common name of *broom grass*. Together with the *Pinus taeda* they usurp nearly all the uncultivated "old fields" of the southern states.

The *Pinus taeda* grows naturally in the rich, wet soils of the southern states, mingled with other forest trees. It is the largest of the southern pines, and its seeds being easily, and almost universally disseminated, over the country, it is the first to spring in those lands which are thrown out of cultivation, and hence has acquired pretty generally the name of "old field pine." Leaves six to ten inches long, by threes, cones shorter than the leaves.

Pinus variabilis. Leaves by pairs and by threes, slender channelled; cones small, (two to three inches long,) solitary; grows along the sea-coast of Carolina and Georgia.

P. rigida. Leaves by threes, the sheaths short; cones ovate, scattered or clustered—flowers in April.

P. serotina, (pond pine.) Leaves by threes, long, (six to eight inches;) cones three-fourths of an inch, globular, frequently opposite in the small branches; grows in damp soils.

Pinus palustris is the pitch pine of the southern states, called "long leaf pine." Cones six to ten inches long; leaves twelve inches long. The south eastern part of Virginia is its northern limit. This tree affords most of the turpentine of commerce. The name *palustris*, originally imposed upon it, (by Linnæus,) is a great misnomer, as it never grows in swamps. The younger Michaux, in his splendid work on the "Forest Trees of North America" has endeavored to correct this error, by calling it *Pinus australis*, (southern pine,) but he has not been followed by other botanists, who (as Cicero said of himself) "prefer to err with Plato, rather than think aright with others."

Pinus inops. (Jersey pine.) Leaves short, by pairs; cones recurved, as long as the leaves. It is probable that this species is found with you.

The "Encyclopædia of Plants" is a useful book, especially to learners. From the index at the end you may find any genus which it contains. The first column of figures on the left hand in the index, refers to the page. On that page you will find one species (or more) of each genus figured. The number attached to the figure refers to the species above. Beneath, you find remarks on each genus, &c. The best work yet published on the botany of the south, is the "Sketch of the Botany of South Carolina and Georgia," by Stephen Elliott, of Charleston.

Dr. Forrey, of New York, contemplates pub

lishing a new Flora of North America, brought down to the present time. It is a great desideratum, and the work is in good hands.

[The foregoing are answers to queries sent to our correspondent, and not designed for publication—but we have taken the liberty thus to use the extract, presuming that there can be no objection.]

Henry county, March 7th, 1835.

To the Editor of the Farmers' Register.

The subjoined remarks I received from one of the most experienced commercial houses of Richmond, upon the management of tobacco (our staple.) I think they contain useful, solid, practical suggestions, which if made public, as the prizing season is now approaching, may be of service to this region of country, though they were not thus intended by the author, being merely addressed to me in a letter, after making sale of my crop. If you should think them of sufficient importance to give them a place in your Register, you can do so.

Respectfully, yours, &c.

G. H.

USEFUL HINTS UPON THE MANAGEMENT OF TOBACCO.

We take the liberty of offering some suggestions for your consideration, in the management of your tobacco, which our experience here, as well as remarks made to us by our friend in Great Britain, induce us to believe, if adopted, would add materially to the value of tobacco for the British markets. The tobacco should be so assorted, as that each hogshead be uniform in color, size, and substance, well cured, and with as little fire as can be applied, to secure against injury in the sweat—prized as it can be to avoid injury by breaking the leaf. It should not be bruised by heavy prizing, it being important that the tobacco when taken from the hogshead for use, should be free and leafy, not matted and stuck together—from 1,300 to 1,500 according to the quality of the tobacco, being sufficiently heavy for the hogshead. In place of its being prized flat and open, the leaves of the bundles interlocking with each other, the leaves should be closed and appear as if each bundle had been drawn through the hand, laid straight in the hogshead, a bundle only at a time, so that when the sample is drawn, it looks bulky for its weight, and each bundle separating from the other without force, which preserves the leaf from being injured by breaking, when handling for use. We are satisfied that such management will be well compensated by the additional price the planter will obtain for his tobacco. We presume you are aware of the importance of tobacco standing on the ground until it is fully ripe. Many planters err by cutting too soon. Stout body, that is rich, thick tobacco, is greatly preferred. As to color, from a lively bright to a nutmeg brown, are preferred. Red, or what is familiarly called "foxy," is the worst color. Green is also objectionable; but a mixture of green and yellow, when the tobacco is new, is a good color. In the sweat such, in a good degree, loses the green appearance.

ON THE PROPER MANAGEMENT OF POSTS, WITH REFERENCE TO THEIR DURABILITY. To the Editor of the Farmers' Register.

Perhaps there is no subject connected with agriculture, on which a greater diversity of opinion prevails than the question, whether, with reference to their durability, posts should be put in the ground green, or seasoned? When I first settled, I took considerable pains to inform myself on this point, by consultation with those whose experience, should constitute them proper fountains of information. The diversity to which I have alluded, impaired greatly the acquisition of decisive results. Mr. Thomas Thweatt, of Dinwiddie, (a gentleman of great judgement and observation on all agricultural subjects,) related to me a circumstance which contributed much towards the attainment of my object. He stated (if my memory be correct,) that in the erection of his garden—a sufficient number of posts as he supposed, were prepared and suffered to remain until they were thoroughly seasoned. Its completion, however, required one in addition, which was taken from an adjacent tree, and immediately put in the ground. Seventeen years had elapsed, and every post had rotted down except that one, which remained sound. In the progress of my investigation another instance was related in which an entire side of a garden exhibited the same results. My own limited experience furnishes an incident worthy of being mentioned. My garden enclosure was erected of posts while green. Several pieces remained exposed, until they were completely seasoned. Out of these a horse-rack was constructed, which has entirely rotted down, while every post in the garden remains firm. From these facts I deduce the belief, that a post planted when green will last longer than one previously seasoned; and for the reason, that the operation of seasoning produces cracks in the timber, which admitting the moisture from the ground cause its decay. I recollect to have read the account of an experiment, proving that the inversion of posts, from the direction in which they grew, operated beneficially. Two gate posts were hewn from the same tree—one was planted in the manner in which it grew, the other inverted. The former rotted down while the latter was sound. It was accounted for in this way—that nature had formed valves for the *ascension* of the sap, which allowed the moisture from the ground to penetrate through the same channel; but that the inversion of these valves, interposed a barrier to its admission. This theory corroborates the idea previously expressed, that the moisture of the ground, alternately penetrating within the timber and in droughts, measurably receding, causes its decay. Whether the posts should be cut while the sap is up or down, I am unable to determine. A writer in some of the numbers of the American Farmer, states that oak timber should be cut while the sap is up, because it is glutinous and forms a cement, or substance which acts as a preservative.

I have ventured to express these hasty and imperfect reflections, with the hope that though they may not impart any useful information, they may elicit some from others. These are controverted subjects, in which every person who erects a gate or encloses a garden is deeply interested—and their further discussion will be valuable, at least to

For the Farmers' Register.

FURTHER OBSERVATIONS ON THE GREEN SAND AND CALCAREOUS MARL OF VIRGINIA.

By WM. B. ROGERS—Professor of Natural Philosophy and Chemistry, William and Mary College.

In a communication published in the 3rd No. of the Register, I announced the discovery of the green sand, or silicate of iron and potash, in the ordinary tertiary marl in Lower Virginia. Geological considerations, taken in connexion with this discovery, led to the inference that an older deposit, consisting in much larger proportion of this peculiar substance, would be found in a region more remote from the seaboard, and not far below the head of tide; and from the great agricultural value of this substance, as proved by the experience of the farmers in New Jersey, I was induced to point out its probable position, and to give such hints and directions with regard to its accompanying indications as might prove useful in any researches which might be undertaken by persons residing in the region in which it was supposed to exist. Since the publication of the paper referred to, as far as other engagements would permit, this important inquiry has been actively continued, not only in reference to the presumed deposit above mentioned, but also to the extensive calcareous formation of our lower counties.

Besides the practical importance of this investigation to the agriculture of a large district of the state, in a purely geological aspect, it was calculated to excite the highest interest. In the vast region of our tide-water country, at farthest, only two members of the *tertiary* group of formations had been hitherto discovered, and no decided indications of a *secondary* deposit likely to prove interesting to men of science, had been found. At the mouth of the Potomac, and at some other points, a deposit had been detected by Mr. Conrad of Philadelphia, which from the great predominance of shells of *existing* species, was regarded by him as belonging to the upper or *newer tertiary*, and as analogous to the Crag of England. The same eminent conchologist by an examination of numerous fossils from York town, Suffolk, the James River, near Smithfield, and other localities, had clearly proved that this portion of the *tertiary* series was of greater antiquity than the former, and accordingly he has recently applied to it the title of *middle tertiary*—which, as some geologists in Europe divide the *tertiary* group into *four* periods, would include both the second and third of these subordinate formations. The *lower tertiary*, which Mr. Conrad had so successfully investigated in Alabama, had not as yet been brought to light within the limits of Virginia. Thus, therefore, these inquiries appeared fraught with the lively interest of scientific discovery, while at the same time they inspired the animating hope, that in some of their results, they might eventually be found conducive to the interests of an important district of the state.

From the great extent of the *middle tertiary* of Lower Virginia, it was to be expected that, notwithstanding the diligence and learning of those who had visited several of its interesting localities, with the view of studying its fossil contents, an extensive field of future discovery would be opened

to the scientific explorer—and a great variety of new and peculiar fossils would be brought to light. To a certain extent this anticipation has been realized; and the occasional examinations which I have made in this vicinity, and at some remote points, have been rewarded by an extension of the list of fossils, and the discovery of a number of new and interesting species. To the readers of the Register, generally, the details of these observations would appear unimportant, if not useless, and must therefore be omitted. At the same time, I may be allowed to add, that such facts are frequently invested with a *practical interest*, by the aids which they furnish to other and more important discoveries; and that, however little value, in the abstract, would attach to an enumeration and description of the shells, zoophytes and other remains of our marl banks, they are absolutely essential in studying the physical history of this portion of the globe, and may prove of some assistance not only in guiding the researches of the farmer after marl, but in directing his choice of calcareous manure when various deposits of this substance are offered for his selection. Of the latter point, several striking illustrations might be adduced—but I shall content myself, for the present, with the statement of a single fact. A small shell of rough exterior, and rather irregular form, a species of *chama*, is frequently found in very extensive beds in this vicinity and at other points, forming nearly the entire calcareous portion of the deposit. From its peculiar form and friable character, it is most generally in a condition to be eminently serviceable as a manure. As the strata both above and below are often of a very different texture, though perhaps nearly equal to it in regard to their calcareous contents, a choice is at once presented to the farmer, in which, he will be guided even more by the nature of the shell embedded, than by the comparative abundance of carbonate of lime. But so little attention has been paid to the characters of the fossils contained in our marl-banks, that even in places where the manure has been longest and most successfully in use, a less valuable stratum is sometimes selected in preference to one of superior fertilizing power. A more minute observation of such particulars, can scarcely be expected in the absence of some popular guide, in the form of delineations and descriptions of the more prominent shells, exempted as much as possible from technical or merely scientific phraseology. Some such illustrations may hereafter be furnished in a cheap form in the progress of a geological examination of the eastern region of our state.

Since the publication of my former paper, a great number of additional observations have been made with regard to the green sand contained in our ordinary middle tertiary marl. Its uniform presence in this deposit, in a greater or less proportion, seems now to be sufficiently established. That it is *generally* present in insufficient quantity to enhance in any important degree the agricultural utility of the manure, it would be going much too far to assert; but that in many cases the proportion is such as cannot fail of producing highly beneficial effects upon vegetation, would seem to be demonstrated not only by the long experience of the farmers of New Jersey with the green sand itself, but by the observations of individuals amongst ourselves who have been in the habit of

applying a calcareous marl in which this substance is peculiarly abundant. In the vicinity of Williamsburg, almost every variety of the common marl may be found; but that which has been observed to produce the most striking effects as a manure, has uniformly yielded to chemical examination a comparatively large proportion of the green sand. When therefore, it is in the power of the farmer to make the selection, such marl should be chosen, as, along with a large proportion of calcareous matter in a suitable state of subdivision, contains also as great an amount as possible of this auxiliary manure. The beds of *chama* already referred to, as abounding on some estates in this vicinity, are peculiarly rich in this ingredient, and are hence, as well as from their friable texture, generally selected in preference to all others. In some of these deposits, as large a proportion as thirty, and in some specimens forty per cent., has been found; and in cases like this, if we are to trust to the experience of New Jersey, a very marked addition to the fertilizing power of the marl must be ascribed to the presence of this ingredient.

In alluding thus to the influence of the green sand as an auxiliary manure, the inquiry naturally arises, to which of its ingredients are its meliorating effects to be ascribed, or do they arise from the conjoint action of the potash and oxide of iron which it contains? To this inquiry, perhaps, it would be premature to attempt to respond. At all events, the rationale of its action cannot be given with that certainty, which in such matters, it is desirable to attain. As stated in the former communication, its components are protoxide of iron, potash and silice; the latter ingredient appearing to act, as it is known to do in many rocks, in the capacity of an acid. In virtue of the potash contained in the green sand, we would naturally infer an agency in neutralizing acids similar to that of lime, or its carbonate—and the extent to which the manure possesses this property, must appear still further increased when we advert to the chemical nature of the protoxide of iron.

Iron, like most other metallic bodies, combines with oxygen in more than one proportion. These compounds, or *oxides* as they are termed, are two in number, and in accordance with the general rule adopted by chemists in designating this class of substances, that which contains the least proportion of oxygen, is called the protoxide—that containing the most, the peroxide. The rust of iron, and the red coloring matter of ochreous clays and of bricks and tiles, are impure specimens of the peroxide of iron. The protoxide is never found in an uncombined condition; and such is the avidity with which it imbibes an additional quantity of oxygen, or unites with carbonic and other acids, that it undergoes a rapid change whenever disengaged. Hence, under favorable circumstances, a strong neutralizing action might be anticipated from this ingredient of the green sand. We may therefore, for the present, rest our explanation of the agency of this manure upon the alkaline properties of these two constituents, the potash and the protoxide of iron. But in suggesting this explanation, it must be freely confessed that, especially as relates to the action of the protoxide of iron, it must be looked upon as problematical, and requiring for the establishment of its truth, an experimental knowledge of the influence of this

substance upon the growing vegetable, of which nothing has as yet been positively determined.

As already indicated, when these inquiries were entered upon, and at the time when my first communication appeared in the Register, the existence of a *lower tertiary* deposit in Virginia had not been ascertained. The industry of Mr. Conrad had brought to light a formation of this nature in Alabama, and had led to the probable inference that it might be found in Maryland. Moreover one or two of the fossils obtained from the editor of the Register encouraged the hope that it might be found in our own state. The observations of that gentleman respecting the gypseous earth of James River* had appeared some time before, and though nothing positive could be gained from them, in relation to the geological character of the deposit, to which he affixed that name, they threw out the important and sagacious suggestion, that this earth was the same with the green sand of New Jersey, or at least a substance of analogous character. We shall in the sequel, learn that though geologically the two formations belong to periods which are distinct, the gypseous earth contains a large proportion of that particular ingredient, (the green silicate of iron and potash,) of which the New Jersey deposit almost exclusively consists. We are therefore indebted to the editor of the Register, for the announcement of the important fact, that the green sand, or a substance analogous to it, existed in certain localities on the James River.

Following up the suggestions of geological analogy, alluded to in my first paper, and stimulated by the observations and statements of Mr. Ruffin, I have been enabled by personal inspection, and through the kindness of correspondents, to ascertain with certainty, the existence of a *lower tertiary* deposit, throughout an extensive district of Eastern Virginia, and moreover to determine what is far more important to the agriculture of this region, that the deposit in question comprises immense strata of green sand, nearly, if not quite, equal in value to that which is in use in New Jersey. The reader, however, is by no means to infer from the existence of the green sand so abundant, both in this lower tertiary and in the New Jersey formation, that the two deposits belong to the same geological era. I have already stated that the New Jersey green sand, is a *secondary* deposit—and of course anterior to the formation here designated as lower tertiary. The shells and other fossils, entombed in the two deposits are strikingly different, and characteristic of difference of geological antiquity. As it is desirable that clear ideas should be entertained, in relation to the distinction here drawn, I would claim the indulgence of the reader, in presenting such explanations, and illustrations, as are calculated to throw light upon a subject in which, at least in some particulars, all are obviously interested.

The term *primary* having been adopted by geologists as designating that extensive class of rocks which from various indications, appeared in general to have originated *first*, and which are destitute of all traces of animal or vegetable existence—the title of *secondary*, was of course appropriated to a class, apparently of more recent origin, usually overlying the former, and in which, in many

*Article "Gypseous Earth," Far. Reg. vol. I. p. 207.

cases, an enormous accumulation of organic remains had been discovered. A minute examination of these remains, consisting of shells, the bones of animals, &c., disclosed the curious fact that they belonged to races of beings of which, at present, there are only a very few living representations. Subsequent observations, first systematically made by Cuvier and Brogniart in the vicinity of Paris, further demonstrated that overlying the secondary formation of that region, there existed an extensive series of deposits of great thickness, the fossil contents of which were, on the whole, very dissimilar from those of the former—not only *all the species*, but many of the most remarkable animal and vegetable forms being distinct, while at the same time many of the species were observed to be identical with others now alive. The difference thus marked between the two series of deposits, uniformly prevailing wherever they were observed, led to the introduction of the term *tertiary*, to designate the upper and more recent. By scrutinizing in detail the tertiary series, it was soon discovered to consist of several distinct subordinate formations, characterized by peculiar fossils, and becoming more assimilated in their organic contents to the existing living world, in proportion as their position in the series approached nearer and nearer to the surface. The most recent systematic writer on geology, and one of the most learned and able geologists of the day, has distinguished four subordinate formations in the tertiary series—and has given to each a specific name, expressive of its relative period of deposition. Though unwilling to perplex the reader with the terms of science, I may perhaps be excused on this occasion for introducing the names here referred to, on the ground that they are likely to be met with frequently hereafter in geological descriptions of the tertiary deposits of this country—and as they are distinctive of things which are characteristically different, and which have received no other denominations so appropriate, they have a just claim to be received. The terms thus employed by Mr. Lyell, the distinguished geologist above alluded to, are—

1st. *Pliocene*, signifying *more recent*, and divided into *newer* and *older Pliocene*. Under this head are comprised some of the shell deposits near the mouths of our rivers.

2nd. *Miocene*, signifying *less recent*. To this formation belong most of our calcareous strata which have previously been referred to under the title of middle tertiary.

3rd. *Eocene*, signifying *the dawn*; indicating the presence of a few fossils analogous to living species, or in other words a dawning of that condition of the animated world which now prevails. Examples of this are furnished in the lower tertiary of Alabama, and the lower tertiary here alluded to as recently discovered in Virginia.

The nature of the materials in which the fossils of these different deposits are embedded is very various. Sometimes the formation is a soft sand or clay—sometimes a sandstone or limestone of comparative hardness. In some cases the deposition appears, from the nature of the fossils, to have been made beneath the ocean—sometimes at the bottom of an extensive lake. In the vicinity of Paris, there are three marine formations alternating with two of fresh water or lake origin; and from one of the latter, the celebrated gypsum or

plaster of Paris is extensively quarried. In Virginia, no traces of a fresh water tertiary have as yet been discerned. The general direction of the deposit is horizontal, and the whole appears to have been formed at successive eras beneath the waters of the ocean.

From what has now been said, it will at once appear that strong features of resemblance are presented in the geology even of the more recent formations in this country and Europe. The most striking similarity exists between the secondary of New Jersey and that of the Paris basin—as far as fossil contents are concerned. But in Paris, a great proportion of these fossils are embedded in chalk; whereas, in New Jersey, no chalk has been discovered, and its place is occupied by green sand, very similar to that, which, in the former locality, alternates with the layers of chalk.

The lower tertiary or eocene of Virginia is found in a band of variable, and as yet unascertained breadth, traversing the state nearly in a direction from north to south. It makes its appearance on both sides of the Potomac, in a line a little east of Fredericksburg. It then crosses the Rappahannock near Port Royal, the Pamunkey probably near Piping Tree, and the James River at Coggin's Point. With regard to its course further south, though its existence is known, additional data are required.

In general character, this formation may be thus described. At the base of the cliff or bank, there usually exists a stratum of what at first sight appears to be a blue or black clay, but which, on further examination, is found to consist principally of particles of the silicate of iron and potash, which when dried, becomes of a lively green color. Mingled with this substance are portions of common clay and sand, and numerous minute shining scales of mica. Embedded in the mass, and usually in a very friable condition, numerous shells chiefly of small dimensions will be found. Sometimes however, the matter of the shell has entirely disappeared, leaving a distinct cast or impression in the earth, by which its specific character may often be ascertained. Immediately above this stratum is a heavy deposit of what Mr. Ruffin has described as gypseous earth.* Large masses of crystallized gypsum, and sometimes the most beautiful groups of perfect crystals of this substance, are disseminated throughout this layer. It was this portion of the formation which Mr. Ruffin conceived to be identical with the green sand of New Jersey. In color, this stratum varies

* The term "gypseous earth," used in the article referred to above, was applied not to a part, (as here supposed,) but to the whole of that formation which Mr. Rogers has since shown to be of "green sand." But it was also stated, that by the general application of that term to the extensive beds which seemed to have had a common origin, (and formerly, the same chemical composition,) it was not intended to convey the opinion that all this earth contained sulphate of lime, either in crystals or finely divided. On the contrary, that ingredient was said not to be present, in any perceptible quantity, in but very few parts of the great body of what was there called "gypseous earth."—See Farmers' Register, Vol. I. p. 208.—ED.

from a greenish yellow to a brown. Besides a considerable proportion of green sand, it contains, in addition to the crystalized gypsum, a notable amount of this substance in a subdivided state, and seemingly occupying the place of the shells which were formerly present, and have been decomposed under the chemical agency of some substance which filtrated in solution through the mass. Incumbent upon this bed is a thin layer of very pure white clay, of a texture which would recommend it to various useful purposes. Overlying the clay is a stratum of shell marl in a very subdivided state, containing masses of casts and shells approaching to the hardness of rock. This is the uppermost layer of the eocene or lower tertiary formation. Yet in some places a stratum of the ordinary middle tertiary marl rests almost immediately upon the former, and would not by an ordinary observer be recognized as distinct. At Coggin's Point, where the succession of strata now noted was observed, a thin and scarcely distinct layer of small brownish red pebbles intervened between these two layers of shells, seeming to mark a comparatively violent action of the waters in the interval of the two deposits. But an examination of the shells, in these two contiguous strata, affords abundant evidence of their belonging to distinct geological epochs. In the upper stratum the large scallops, the common oyster of our marl, and all the usual ingredients of our middle tertiary or miocene formation, may be recognised. In the lower bed few or none of them exist, but certain characteristic shells belonging to the eocene period are entombed. Similar fossils appear below, in the green sand beneath the gypseous earth; and here a great variety of beautiful specimens may be discerned. An enumeration of these fossils in this place would of course be attended neither with utility nor interest, and indeed, were it advisable in the present stage of the inquiry, it could not be made, on account of the necessity of comparing the specimens with shells from other localities in Europe and this country, in order to identify species, and to decide upon those which are new, or peculiar to our own formation. That many such exist, I have every reason to believe, and with future leisure it is hoped that they will be named according to the fashion of the day, and described in the appropriate place. It will however be of real value to the reader, in any inquiries which he may institute, in reference to this formation, to obtain some general idea of the characters of two or three of the more conspicuous and characteristic shells. The observer will perhaps be able to recognize the following:—

1st. The *cardita planicosta*. This shell is of various sizes, rarely however equalling that of the clam. In form it bears some resemblance to that shell; but on the convex side a number of flattened ridges run from the knobbed extremity near the hinge, spreading from each other and enlarging as they approach the margin. The hinge part of the shell is very thick. This shell, occurs abundantly in the eocene or lower tertiary of Europe, and also in that of Alabama.

2nd. *Ostrea sellaformis*, or saddle-shaped oyster. This shell is very peculiar, having, when full grown, such a lateral extension on each side as to present, when the hollow of the shell is turned down, a very distinct resemblance to a saddle with

its two depending flaps. It is found abundantly in the eocene of Alabama.

3rd. *Fusus longaevus*, a small shell less than an inch in length, and resembling in general form, those which are commonly called conchs. It is however flattened down on one side as if it had been subjected to pressure. This shell occurs abundantly in the eocene of Europe—but I believe has not until now been discovered in the corresponding formation of this country.

These three fossils, which are all found in great numbers in such of the eocene localities in Virginia as I have examined, are sufficient to identify the formation wherever they may be discovered. But as already indicated, they are accompanied by a variety of other shells, a large proportion of which, would appear to be peculiar to this particular region. It would seem that the eocene of Virginia though agreeing in most respects with that of Alabama, contains some fossils found also in the Paris eocene, and which are absent from that of Alabama.

In most of the specimens of marl from this region hitherto examined, besides a large amount of green sand, I have found a considerable proportion of gypsum, and in some of them as much as forty or fifty per cent. of carbonate of lime. Specimens received from Dr. Corbin Braxton, at the Piping Tree, were found to contain, along with much green sand, a great amount of the carbonate of lime, and some gypsum. Judging from its composition and texture, it must be looked upon as a very valuable manure. At Coggin's Point, the lower stratum before described, contains from sixty to seventy per cent. of the green sand, with a small proportion of carbonate of lime, and occasionally a little gypsum. The next deposit above, (the gypseous earth) abounds in gypsum, but contains less green sand than the former. Of this ingredient, however, it still possesses a very considerable proportion. In alluding to the powerful effects of the gypseous earth, in a trial which he made, the author of the Essay on Calcareous Manures describes them as much greater than could be accounted for by the proportion of gypsum present, and hence throws out the suggestion that some other fertilizing ingredient was contained in the earth. This additional effect must doubtless be ascribed to the presence of the green sand.

In prosecuting the geological survey of Maryland, Professor Ducatel has been enabled to ascertain the existence of a green sand deposit throughout an important district of that state. Of its existence on both sides of the Potomac I was already fully aware—and it affords me much satisfaction to find that the suggestions based upon general geological considerations, which were presented in my former paper, have already been so actively and ably followed up by this enlightened and diligent observer. Of the identity of some of the green sand deposits described in his report, with that now ascertained to exist in the eocene of Virginia, I am as yet by no means convinced; but a minute geological examination, such as that already instituted in Maryland, and that which is looked to with some interest in Virginia, cannot fail to throw very useful light on this, as well as all the other important deposits in the tide-water region of the two states. Mutual benefit would arise from the co-operation of surveys, conducted

at the same time in the two adjoining territories, and in this way the interests of the states, as well as those of science, would be most effectually and speedily promoted.

To the very meagre details, in relation to the green sand, presented in this communication, I may hope ere long to be enabled to add the results of extensive and minute personal observation in the interesting region in which the eocene formation has been detected. In the mean time, the progress of inquiry may be greatly furthered by the friendly aid of those who, from their residence in the region in question, will have it in their power readily to collect specimens of shells or earth, and to transmit them to me for inspection. I would therefore, earnestly solicit assistance of this kind, and in return, I will gladly communicate the results of any observations I may be thus enabled to make. To urge the importance of this, and other similar inquiries, would now no longer seem to be necessary—since a large portion of the intelligence and enterprise of our state appears prompt to recognize their value, and interested in furthering their active and successful prosecution.

From the New England Farmer.

STRING BEANS (OR SNAPS) DRIED FOR WINTER GREENS.

Mr. Fessenden—If you think the following statement of facts will enrich your weekly paper, and place in every farmer's reach an additional luxury, I shall look for it in your next number.

In consequence of a suggestion dropped in my hearing by an elderly farmer's wife, I took a quantity of string beans from the poles, last summer, (the Agricultural) [!] prepared them entirely for the pot, spread them on a large table-leaf in the sun, and dried them precisely as apples are dried. When perfectly divested of moisture, they rattled like nut shells, and excited no small degree of ridicule. I bore it quite philosophically, and laid the supposed treasure aside for winter. In February, I ordered a handful put into water at night, to be kept warm till the next day, dropping into them a little pearl ash. The next day I found them *green* and *swollen* almost to their size on the pole. They were boiled three hours, and tasted almost as if taken fresh from the garden. I had so pleasant a dish of them to-day, that I wished it possible for you, sir, to have shared the luxury with me.

Permit me to say, seamen would find them no less, and I believe more valuable, on long voyages, than dried apples, and the process of drying is the same.

Lancaster, March 12, 1835.

SEXEX.

From the Genessee Farmer.

DRAG-LOG OR DRAG-ROLLER.

An implement has been in use in this part of the country for several years, which I have not seen elsewhere. It was invented by Thomas B. Gay, a practical and intelligent farmer of this county, and though it has perhaps only been adopted by some agriculturists in this vicinity, who are in the habit of preparing their grounds neatly for the reception of seed, yet it deserves to be better and more extensively known.

The implement is called indifferently *Drag-log* or *Drag-roller*, and differs in principle from the common roller being deprived of the rotary motion, and consequently *drawn* or *dragged* over the land. Such farmers as have used it fully concur in the opinion—to the correctness of which I can also attest from my own experience—that it is not only a convenient but frequently indispensable agent in reducing rough or cloddy ground. The most stubborn piece of land may, by one or at most two timely operations, be pulverized more completely than by double or treble the number of ploughings. The first application should be made immediately after the land is turned over—that is to say, all land ploughed during the day should be subjected to the operation in the afternoon. When such land comes to be re-ploughed it will always be found in a light and friable condition.

The drag-roller is not recommended for the purpose of being substituted for the common roller, or in any manner superseding it. The respective merits of the implements rest on different basis. The common roller must remain highly useful in giving a smooth surface to land in order to enable the scytheman to harvest the crop with facility. The drag-roller is intended to assist in the preparation of the ground for the reception of seed; and will be found exceedingly beneficial in attaining this object in all spring and summer fallows. When the ploughing has been done in the fall or winter, the action of the frost alone will produce the desired effect. On grass or sward land well turned over, it will aid in smothering such roots or spires as might otherwise grow, by filling the interstices with the loose mould.

The construction of the drag-roller is sufficiently simple. The piece of timber may be about six feet long, and eighteen or twenty inches in diameter, which may be lightened to any extent by taking from the upper side: one-third or even one-half may be hewed off according to the size of the log. Two pieces of scantling introduced obliquely by mortice and tennon at a suitable distance from the ends of the log, and made fast to each other opposite to the middle, completes the fixture, which may be drawn by either horses or oxen. It is desirable to have the diameter of the size recommended, that the implement may pass smoothly over the ground:—if too small, the earth will gather before it, by which the progress will be impeded, and the efficiency of the operation impaired.

T. S. P.

Goochland county, Va., 2 mo. 27.

FLORIDA COFFEE.

From the Augusta Sentinel.

Dear Sir.—The difficulty with which I procured a pamphlet, containing information with regard to the culture of the "Florida coffee," induces me to offer to the public through your paper the following information with regard to this invaluable article.

It should be planted like cotton and at the same time, in any climate where cotton may be cultivated to advantage—on beds five feet apart (for in good land the plant grows from 10 to 12 feet high,) or nearer on poor land. Two pounds of seed will plant an acre which will yield from 1500

to 2000 lbs. coffee: blooms from early in July to November, and ripens from early in August till frost. The grains are about the size of a grain of wheat, but more the shape of the nux vomica; it grows in pods containing from 40 to 60 grains each. It must be gathered as fast as it ripens. Neither horses, hogs, or cattle will eat it; nor is it disturbed by caterpillars or insects. It returns abundant foliage to land—better for bees than buckwheat, as pure honey rises from the plant. It may be cultivated to advantage on land exhausted by the cultivation of corn or cotton, and with low fences, as horses, cattle, or hogs will not eat it.

AMOS W. HAMMOND.

Ruckersville, Ga.

THE INDIAN PEA.

To the Editor of the Farmers' Register.

Among all the various plants of the leguminous kind, known to us southern people, I deem the Indian pea by far the most valuable: and having paid much attention, for many years, to its culture and uses, I have concluded to offer you the result of my observations, as the season for planting them is close at hand. I ought to have said—the commencement of the season; for you may begin in April and continue to plant the different varieties until late in June.

Nothing cultivated by us southern farmers and planters, furnishes a stronger proof of the great inconvenience and disadvantage of having many different names for the same plant, than the Indian pea. Every man's experience must have convinced him of this; for there is scarcely a single variety—of which I myself know at least fifteen, that has not two, three, or four different names for it. Hence there is great difficulty in procuring the kind you want, unless you can succeed in a particular description of the pea itself.

It may possibly be a vain attempt to reduce this chaos of names to any thing even approaching to regular order and certainty; but the effort is worth making, if I can succeed only partially. How many varieties of this valuable esculent there may be, I will not venture to affirm; neither will I undertake to give all the names by which I have heard each variety called in particular counties or neighborhoods; for some would have as many "aliases," as the most famous of our swindlersever had. But I believe I can suggest a general term, in the suitability of which, all will concur, that will comprehend at least six of these varieties known to myself. For instance, the term "*crowder*" may be applied with perfect propriety certainly to that number; because its ordinary meaning indicates a peculiar circumstance which distinguishes the whole of them from all the other varieties yet cultivated among us. It is, that they grow so much closer together in the pod, as to *flatten each other at the ends*, and hence, called "*crowders*." Of course, they contain more peas in a pod of the same length, than any other variety, and are, in general, more productive; although they differ somewhat from each other in this respect. The varieties of the crowder peas which I have seen in cultivation are—the jet black, the white with a black eye, (now very scarce) the gray, the straw colored or sugar-pea, the claret

colored, and the yellowish brown. All of these are early peas, except the claret colored; but the last, is earlier not only than any of the crowders, but than any other kind that I have tried. Some, however, think the red and white (not a crowder,) the earliest of all the varieties. All the crowders are good for table use; but the sugar and the gray are generally deemed the best—better in fact, than any, unless perhaps, it may be what we call the *North Carolina pea*, merely because it was introduced among us from that state. It is a white pea with a pale greenish eye, and longer than 'tis thick. The other varieties which I have seen cultivated are—the common black-eyed pea, in such general demand among our sailors. Of this kind, there are two varieties: one much larger, but less productive than the other. In preferring the black-eyed pea, I beg leave to tell our sea-faring people, that they cheat their palates most egregiously; for there are at least four or five better varieties for table use, which might be procured in equal abundance, and equally cheap, if there was a demand for them. The smaller black-eyed pea is very productive; but as an improver of land, it stands at the bottom of the scale, having less vine than any other kind. Another variety is the *ladies' pea*, as some call it, or the *gentleman pea*, as 'tis called by others. It is the smallest I know, except the dark bottle green, and is used only for the table; but is actually the most tasteless of all that I have ever tried. It makes, however, a handsome dish from its peculiar whiteness, and is therefore preferred by those who had rather gratify their eyes than their palates in such matters, which I confess is not my taste. There is another variety differing from that last mentioned, only in size, and in being somewhat longer in proportion to its thickness. The only name which I have ever heard given to this, was, "*the gentleman pea*;" and 'tis well christened, if the term gentleman, according to little Harry Sandford's notion, means something that is good for nothing. Another variety is a white pea with a brown colored eye, which is the only circumstance by which it can be distinguished from the white North Carolina pea already mentioned—that having a pale green eye; but in color, size, and shape there is no perceptible difference. I have heard it called, the *yohorn*—a name by the way, sometimes applied to two other very different varieties. The red and white pea already mentioned, is very early in coming to maturity; but I know of no other remarkable quality that it possesses. Another variety is the well known cow-pea of the Carolinas, by which name it is known in the southern part of Virginia. But in the counties on the Rappahannock, and between that river and the Matapony, it is best known by the name of the *Yeatman pea*, from the circumstance, (as I have always heard) of a Mr. Yeatman having introduced it into Matthews county, some thirty odd years ago, from the Eastern Shore of Virginia. It is of a yellowish color, is very productive both in vine and seed, unusually hardy in remaining uninjured by rain, after being ripe, and is equal, for table use, to several of the other varieties. Another kind is the claret colored crowder, which, although already mentioned, deserves a more particular notice, from its possessing all the most valuable qualities of the cow or Yeatman pea, together with such a degree of hardness that many of them will remain in the

ground all winter, and come up in the following spring. Of this fact I was assured by the North Carolina gentleman who gave them to me. He also stated, that they were deemed more valuable in that state—at least in the eastern part of it, than any other Indian pea: so much so indeed, that in renting out land, it was a common stipulation, that the whole of the corn-land should be planted with these peas, from a general belief, that, if the vines were all left on the ground, it might be cultivated every year, without being impoverished. The qualities ascribed to this pea, belong also to a jet black pea, (not a crowder,) which I have heard called the "tory pea;" although why or wherefore, I could never ascertain; for in toryism I have never heard of any thing good, whereas, this black pea seems fully equal to the two last mentioned varieties in all their most estimable properties. I once saw a very small kind of pea, of a bottle green color, when perfectly ripe, and with a black pod about four or five inches long. It was recommended to my father as a fine soup pea; but I cannot recollect whether he ever tried it for that, or any other purpose. He planted them but once, and I never heard of the variety afterwards. This is the pea which I have already noticed, as being smaller than the ladies' pea.

The cow pea or Yeatman—the claret colored crowder, and the tory pea, are later in coming to maturity, than any of the other varieties. Whether they are more productive in peas, I am not sure; but believe that they are so. Of their producing more vine, I am very certain. They are, therefore, greater improvers of the soil where the whole vine is either left on the ground, or ploughed in, as a green dressing, than any other peas. But the whole of the vine at least, must be returned to the land, or it will certainly be impoverished, instead of being improved. Many, I know, entertain the fatuitous belief, that the mere cultivation of the Indian pea will improve land—even where the whole crop is taken off entirely; but it is quite as silly a notion, as that ascribed only to children, of "eating their cake and having it too;" for the truth is, that no plant ever yet cultivated by man, can by any conceivable means, enrich the soil where it grew, if every part of it be removed; and accordingly the whole annals of agriculture furnish not a solitary fact to invalidate this assertion. That some crops injure land less than others is universally known, and believed; but the reason of the fact, very few comparatively speaking, have taken any trouble to ascertain. Can it be owing to any other cause than that the plants which injure least, restore most of their own substance to their mother earth, when they are forcibly taken from her? This, you will perhaps say, is speculation. Be it so, and take it for no more than 'tis worth.

But let us return to the Indian pea. As a green dressing for land, I believe it to be much superior to buck-wheat, or to any thing else that we have tried—simply because it will produce a greater quantity of vegetable matter on land of the same quality; and the poorer the land—if deemed worth cultivating at all—the more manifest will this excess of quantity be. If taken off entirely, few crops exhaust land more; but the vine of all the varieties makes an excellent long forage for common work horses, oxen, milch cows, or sheep; indeed, it is fully equal, when well cured, to any

other long forage whatever, and superior to many kinds, for every sort of stock, except riding and carriage horses. The curing of the vine is somewhat difficult, as it requires more days' sun than any other plant cured for hay. It may, however, be secured considerably sooner by stacking the vines in alternate layers of some six or seven inches thick, with dry wheat, rye, or oat straw, taking care to sprinkle a little salt on each layer of vines. By this means the dry straw becomes nearly as good forage as the vines themselves. Sheep and cattle are particularly fond of it. Many experienced farmers have assured me, and my own experience confirms their opinion, that the dry peas will fatten a horse, ox, sheep or hog, sooner than Indian corn; but the latter must be given towards the end of the process "to harden the fat," as they style it. As food for man, ninety-nine in a hundred, I believe, prefer the Indian pea to the English. This preference among our negroes is, I think, universal.

I have said nothing of the various modes of culture, because I take it for granted no farmer and planter, where the Indian pea is known at all, can be ignorant of it.

J. M. G.

From the Genesee Farmer.

KEEPING SHEEP.

Sowed three bushels of oats to cut before they are quite ripe, for my sheep; this I have found to be the cheapest and best method to winter sheep, of the many ways that I have tried. The sheep will eat it all clean, straw and all, and with it get grain enough (and that being green, I believe it far better than ripe,) to keep them in good condition. I never had a distempered sheep that was kept in this way. Two good sheaves per day, will last twenty sheep through the winter; some days three sheaves and some but one, viz: when they get to the ground; I have tried it and do know. Now, say five months, 150 days, 300 sheaves, that would make twelve bushels to the hundred; would be thirty-six bushels of oats, and the straw. If any of your correspondents can do better, and with less expense I should be glad to know it.

From the New England Farmer.

KNITTING MACHINE.

Mr. Editor—Allow me to call the attention of the public to a machine for knitting stockings and other knit work, to be seen at the Agricultural Warehouse, No. 52 North Market st. It is a small neat, operating machine by which persons in indigent circumstances, and children may be employed to great advantage, and it opens a good field for the investment of capital. It occupies about a cubic foot and is operated upon by turning a crank, which requires no more power or skill than a common hand organ, except when necessary to widen or narrow, a stitch is dropped or added by hand. The machine does the work of six expert knitters, and is very simple, and does its work with astonishing rapidity and precision. It is superior to the stocking loom, as that requires an apprenticeship to learn to work it, and is not calculated for families, whereas this machine can be worked by any intelligent little girl, after a few minutes instruction. It is capable of knitting

either wool, cotton, silk or linen. The overseers of all public institutions are particularly invited to examine it, as it may be very advantageously employed by them, and is within the means of the poor generally.

[The following is the statement of Mr. John Morehead describing his management of a crop of carrots, for which a premium was awarded to him by the Massachusetts Agricultural Society.

From the New England Farmer.

CARROTS AS A FIELD CROP.

1. The land was planted in corn in 1833, and was in good heart. 2. It has been used as a pasture for more than thirty years; one-half of it was planted without any manure, the other half with a mixture of kelp [sea weed] and common barn yard manure; the product was forty bushels or over; it was hoed in the usual way three times, besides twice ploughing. 3. In the latter part of the winter of 1833, and the first part of the winter of 1834, there was carted seventy-three loads of kelp from the sea shore, besides two loads of barn yard manure, making the whole seventy-five loads for one horse; the loads were about one-half as much as a three cattle team would draw; the distance about one mile; the kelp was laid in small heaps, three to each load, upon a piece of land containing one acre and three rods. 4. The quantity of seed used was a small fraction over three pounds. 5. In the beginning of April, the old corn roots were dug up, the kelp spread, and the land ploughed; it was then hoed across the furrows, as it was not loose enough to receive the seed. Besides, there were some small stones and brier roots taken out. It was harrowed three times with a one horse harrow, then raked, which completed the preparation for sowing. The seed was sown from the 14th to 19th of April. First time of hoeing from 29th of May to the 3d of June; second time from the 20th to the 28th of June; third time from the 19th to the 29th of July.

The seed was sowed in rows thirteen inches apart, and after sowing was rolled with a light roller by hand.

Amount of labor:—

Drawing kelp from the beach,	\$25 00
Drawing out the corn roots and taking them off,	1 00
Ploughing the land,	2 00
Hoeing across the furrows and taking out small stones,	5 00
Harrowing and raking it over,	2 00
Sowing the seed and rolling,	6 00
First hoeing,	6 00
Second hoeing, weeding and throwing out,	10 00
Third hoeing and weeding,	8 00
Harvesting and measuring the whole crop,	25 00
Carrot seed,	3 00

Total, \$93 00

Began to harvest carrots Oct. 26, and finished Nov. 8. The carrots were first dug up and laid in rows to dry, then carted to a piece of green sward, separated from the tops and dirt, carefully measured and some of them weighed. The whole amount of carrots was six hundred and forty-five bushels, containing fifty-six lbs. and upwards.

From the Fayetteville, N. C. Observer.

RARE FLOWER.

Perhaps few of our readers are aware of the effects which may be produced on fruits and flowers by what is commonly called budding, or inoculating the limbs of trees. We yesterday saw a flower, from the garden of a gentleman of this county, (who has made many experiments of this kind,) combining the qualities of the rose and peach blossom. The stem and leaf were of the peach, except that the latter was slightly serrated similar to the rose leaf; the leaves of the flower were of the color of the peach, and taste of the rose; the farina resembled that of the peach. The flower was about four times the size of the peach blossom.

From Insect Transformations.

RAFT OF EGGS OF THE GNAT.

The most singular disposal of eggs with which we are acquainted in the economy of insects, is exemplified in the common gnat (*Culex pipiens*, LINN.) It is admirably described by Réaumur, though it seems first to have been discovered by Langallo, who mentions it in a letter addressed to Redi, printed at Florence in 1679; and by Alloo, who actually saw the eggs laid, and afterwards sketched a figure of them. Those who wish to witness this singular operation, must repair before five or six o'clock in the morning to a pond or a bucket of stagnant water frequented by gnats; when Réaumur went later in the day he was always disappointed.

The facts of this disposal of her eggs by the common gnat, are sufficiently curious to excite attention to them; and, therefore, it is not easily to be understood how the following erroneous and fanciful account originated. "The manner," says Goldsmith, "in which the insect lays its eggs is particularly curious; after having laid the proper number on the surface of the water, it surrounds them with a kind of unctuous matter, which prevents them from sinking, but at the same time fastens them with a thread to the bottom, to prevent their floating away, at the mercy of every breeze, from a place the warmth of which is proper for their production, to any other where the water may be too cold, or the animals, its enemies, too numerous. Thus the insects, in their egg state, resemble a buoy which is fixed by an anchor. As they come to maturity, they sink deeper, and at last, when they leave the egg as worms, creep to the bottom."* This fable, which was first mentioned by Pliny, is repeated verbatim by Bingley.† The impossibility of a gnat spinning a thread, and plunging into the water to fix it at the bottom, never struck these writers.

We are the more anxious to expose these erroneous accounts, from the persuasion that a taste for natural history has been more injured by numerous similar statements, which could not be verified by a student, in many popular works, than by the driest skeleton descriptions of those who have merely pursued Natural History as a science of names.

The problem of the gnat is to construct a boat—

* Goldsmith, Animated Nature, vi. 337.

† Bingley, Animal Biography, iii. 489, 3d ed.

shaped raft, which will float, of eggs heavy enough to sink in water if dropped into it one by one. The eggs are nearly of the pyramidal form of a pocket gunpowder-flask, rather pointed at the under end, with a projection like the mouth of a bottle. The first operation of the mother gnat is to fix herself by the four-legs to the side of a bucket, or upon a floating leaf, with her body level with and resting upon the surface of the water, excepting the last ring of the tail, which is a little raised; she then crosses her two hind legs in form of an X, the inner opening of which is intended to form the scaffolding of her structure. She accordingly brings the inner angle of her crossed legs close to the raised part of her body and places in it an egg, covered, as is usual among insects, with a glutinous fluid. On each side of this egg she places another, all which adhere firmly together by means of their glue, and form a triangular figure thus *³, which is the stern of the raft. She proceeds in the same manner to add egg after egg in a vertical (not a horizontal) position, carefully regulating the shape by her crossed legs; and as her raft increases in magnitude, she pushes the whole gradually to a greater distance, and when she has about half-finished, she uncrosses her legs and places them parallel, the angle being no longer necessary for shaping the boat. Each raft consists of from two hundred and fifty to three hundred and fifty eggs, which, when all laid, float on the water secure from sinking, and are finally abandoned by the mother. They are hatched in a few days, the grubs issuing from the lower end; but the boat, now composed of the empty shells, continues to float till it is destroyed by the weather.*

Kirby justly describes this little vessel as resembling a London wherry, being sharp and higher, as sailors say, fore and aft, convex below and concave above, and always floating on its keel. "The most violent agitation of the water," he adds, "cannot sink it, and what is more extraordinary, and a property still a desideratum in our life-boats, though hollow, it never becomes filled with water, even though exposed. To put this to the test, I placed half a dozen of these boats upon the surface of a tumbler half-full of water: I then poured upon them a stream of that element from the mouth of a quart bottle held a foot above them. Yet after this treatment, which was so rough as actually to project one out of the glass, I found them floating as before upon their bottoms, and not a drop of water within their cavity."† We have repeatedly pushed them to the bottom of a glass of water; but they always came up immediately to the surface apparently unwetted.

From the American Rail Road Journal.

AVERY'S ROTARY ENGINE.

In our brief notice of this engine in the last number of the Journal, we omitted to state a very important fact in relation to the construction of its boiler and chimney.

It has been deemed a very important matter, and great efforts have been made, to construct locomotives in such a manner as to avoid the danger arising from sparks from the chimney—with

what success others have met, we cannot say; but in this respect Mr. Avery has been eminently successful—as when we were with it, in running near ten miles, not a particle of fire was discovered to issue from the chimney—and we are told that neither fire nor cinders ever annoy passengers, as they never come out of the chimney.

From further experiments and investigation in relation to this engine, we are disposed to *predict*—although no pretensions are made to the gift of prophecy—that a locomotive engine will be constructed upon Avery's plan, within the next six months, which shall make a trip from Jersey City to Newark, and back again to the Ferry, in 45 minutes, with 100 passengers—passing the Bergen Hill, with an elevation of 152 feet to the mile.

ANALYSIS OF THE LEAVES OF THE MULBERRY.

Translated for the Farmers' Register from the *Compte rendu des séances de la Société Royale et Centrale d'Agriculture* of December 1834.

M. D'Arcet (the son) sends a letter upon a chemical analysis which he has made of the leaves of the mulberry. The result of this analysis shows that the mulberry leaf contains four parts in the 100 of azote. It may result from this composition of mulberry leaves, that silk being a product in a high degree supplied with azote, as an ingredient, mulberry leaves for the nourishment of silk worms could not be advantageously substituted except by other leaves which also contain azote. Then, as it is not known whether other leaves contain as much azote, he will, to that end, make the analysis of such other leaves as are considered proper substitutes for mulberry leaves.

M. Chevreul says that the presence of azote has long been known in the leaves of the mulberry, and likewise in the leaves of many other plants: that the difference which is said to exist between animal and vegetable substances, relatively to the presence of azote in the former, has always been faulty—because, that if, in the mass, there existed more azote, proportionally, in an animal than in a vegetable, still there were immediate products of animals which contained very little azote, and even none—while there were immediate products of vegetables which contained much azote—and *vice versa*. It is not then only the analysis of the vegetables which is necessary, according to M. Chevreul, but also the analysis of their immediate products—and especially, to understand well what of the immediate products serve for the nourishment of the silk worm—since it is well known that insects, even more than other animals, have the property of rejecting, among the vegetable substances on which they feed, and almost as they are taken, those parts which cannot serve for their nourishment, and for the preparation of the secretions which the insects yield.

M. Ardouin adds, in support of what M. Chevreul says, that there are many kinds of caterpillars which produce silk, and in as great quantity as the silk worm, and which live on trees which cannot furnish support to the silk worm.

M. Payen says that, according to his own experience, all the vegetables upon which experiments have been made contain azote *dans un principe continu* from the extremities of the roots to the extremities of the leaves—and even in the

* Réaumur, Mem. iv. p. 621.

† Introd. iii. p. 32.

petals of the flowers, and principally of the stigmas.

CLOVER SOWN ON CORN LAND, WHILE UNDER TILLAGE.

To the Editor of the Farmers' Register.

New York, April 4th, 1835.

Occasionally I have an opportunity of seeing a number of your valuable Farmers' Register, and as I feel a deep interest in the prospect of every thing like improvement in Virginia, (of which state, it is with feelings of pride I claim to be a native,) I cannot but add my humble mite—the result of a conversation held a short time since with a New Jersey farmer.

In conversing with him upon the subject of agriculture as practised in Virginia, I remarked that I was but little acquainted with it either theoretically or practically; but the information I had, was derived almost entirely from the perusal of a number published in your Register and contributed by Hill Carter, Esq. of Shirley, upon the management of his estate generally, and the subject of a rotation of crops. This I endeavored to explain to him in the best manner I could, and believe I made myself understood.

He replied that he had practised the four-shift system, but had latterly adopted a more extended method—dividing his farm into some six or seven fields I think, and practising a proper system of rotation with the benefit of clover.

But upon the use of clover he said he thought he could impart to me a valuable secret. It was a discovery made by himself, had been adopted by his immediate neighbors, and they had all pronounced it in a high degree successful.

He stated it was his custom, immediately after ploughing through his corn a second time, (to weed it,) and after it had attained something like a foot in height, to sow clover seed in amongst it. That the clover would spring up too late to offer any obstruction to the corn, and it would answer the double purpose of not only shielding the earth from the impoverishing heat of the sun, but of also cleansing the field from all noxious weeds. The corn then matures—it is gathered in due season—and then says he, I turn my cattle in upon the clover; or let the field lie as I may think proper. The fall comes, and I plough my field up, and have a fine clover fallow upon which to sow what is usually denominated the corn ground wheat.

The remark struck me, with my limited knowledge of agriculture, as being practicable, and now that the season approaches when it may be tried, or improved upon, I have taken the liberty to communicate it. It can at least do no harm to try the experiment, and if successful, it will always be a source of gratification to me to know that I have suggested any thing, however trifling, that can redound to the advancement of the good "Old Dominion."

W. H. H.

For the Farmers' Register.

VEGETABLE AND MINERAL INTELLIGENCE.

From a variety of experiments made on vegetables, many naturalists are of opinion they possess mind. It is asserted that the common hop, (*Humulus Lupulus*,) directs its course to the

nearest perpendicular object; as if it were assured of the great danger to which it would be exposed by extending its branches on the surface of the earth. The *Euscreta*, American dodder, or love vine, entwines a number of small plants in moist places. The seed is deposited in the earth, and in a short time begins to vegetate—a vine puts up which seizes the first plant it reaches. This plant affords it nourishment—the communication between the earth and dodder is now cut off, and it is dependent on various vegetables for support. If the plant around which the dodder clings becomes unhealthy or dies, the dodder is said to desert it for a better friend. The spiral direction of vines in climbing perpendicular objects seems to be a strong argument in favor of some intelligence, for when they creep horizontally, this is not observed. In climbing objects vegetables have to oppose gravity, and unless they secure themselves by winding round their support, they must necessarily fall to the ground. The cow itch, (*Dolichos Pruriens*,) climbs erect objects, without winding round their support; but it is prevented from falling by a number of radicles that attach themselves to the object. All plants become languid when deprived of light; but if a small hole be made in their apartments, so as to admit light, they find their way to it and creep out as if they were tired of their confinement, and pleased in looking around and contemplating the great variety of objects that present themselves.

The sexual intercourse of vegetables is well known, for it is ascertained that a powder (or pollen) secreted upon the anthers is necessary to render the young seed fruitful: without the male influence, seed cannot ripen or mature.

Venus' fly trap, (*Dionea muscipula*,) deserves notice. The leaf is shaped like a shoe or slipper, the edges of which are notched in such a manner as to form a very singular apparatus. The leaf being very sensitive, when a fly or any insect lights upon it, the leaf closes and confines the object. It is asserted by Mr. Buffon, that the roots of plants will creep aside to avoid bad earth, or to approach good.

Dr. Darwin assures us plants are very particular in selecting their food, though they sometimes, like animals, take in poisonous substances, producing disease and death.

Dr. Hales put the stem of an apple tree in strong brandy: in a short time the stem became intoxicated and died.

When any part of the sensitive plant is touched it falls, which would seem to prove that the plant possesses a sensorium, or brain.

Many of the gossiping female flowers are known to be guilty of adultery by deserting their husbands and kissing other males or *stamens*.

If vegetables did not possess organs of sense, could they be so completely under the influence of heat and cold, moisture and dryness, light and darkness? We know they have life, motion and sensation, and do they not possess mind? If so, is it not probable that minerals and crude matter possess it in some degree? It seems absurd, because philosophy has not yet extended her researches far enough to ascertain the truth of this observation. Is it reasonable to suppose that God has created any thing without intelligence? Has he not given intelligence to the whole globe itself, which is more or less observable according to a

due arrangement of its parts? May not mineral matter possess mind in the lowest degree, and organized matter possess it in the highest degree? These are questions I would respectfully ask, if I could meet with a philosopher who could answer them. Minerals are formed spontaneously by virtue of their affinities: animals and vegetables require seed or eggs, so organized as to possess vitality and irritability. But may not mineral productions have properties in common with vegetable and animal? It is well known that minerals are capable of assuming and retaining certain forms, which forms they will observe in spite of the powers of repulsion. The *nitrate of potash*, (salt petre,) crystallizes in prismatic *octahedrons*; and by virtue of certain characteristic qualities of this and other salts, which they originally possessed, they invariably assume the same forms and appearance. The arrangement, disposition, and order observable in the mineral kingdom, must be as much admired, as that which forms the admirable and exquisite texture of the organic world; for they are both the result of certain attractions and motions, which the constituent parts take in their formation. Naturalists speak in very extravagant terms of the polish and refinement of organic matter; but let them examine minutely the mineral kingdom, and they will find as much order, design, just arrangement, delicate workmanship, regular figure, beauty, variegated color, and in every respect, sublimity and grandeur, rivalling in a very eminent degree, the vegetable and animal world. Let us then, appreciate the value of matter, and say the mineral, vegetable and animal kingdoms all possess mind; that the whole ball taken collectively, is a spiritual mass or portion of divinity, which is to undergo certain forms and then return from whence it came. "All the choir of heaven and furniture of the earth, all which compose the mighty frame of the world, hath not any substance without a mind." If this be the case, mind, like matter, is capable of division; it can be divided and sub-divided into a number of parts, which may exist in a variety of matter, giving it intelligence; and must possess solidity, extension, figure, and continually going the round of circulation, as is the case with matter, and governed by the general laws of gravity and attraction. When disengaged from one portion of matter, it may get possession of another, and thus produce perception in other matter prepared to receive it.

It is well known that mind and matter exist, and that they act and react upon each other: and from this reciprocal action and reaction, arise all ideas and sensations. It is also known, that when an injury is done to the brain, the mind suffers; and if the injury be very great, the mind deserts its habitation never to return. What becomes of it? Does it take its flight to another world; or does it go in search of matter prepared to receive it, and get a new habitation? Mind is matter disengaged from the brain, and of course, material. But here a very important question arises: can any thing like materiality exist, when God is immaterial? He has been pleased to call matter into existence, and is it reasonable to suppose any thing he has created can perish? We speak of the affairs of this world in a temporal point of view, but the wise disposer of the universe, views them in a spiritual point of view: and has created every thing for wise purposes. It is the duty of man,

therefore, to set the highest value on the works of Deity; for the mineral, vegetable and animal kingdoms, have high claims to immateriality. Indeed, matter, strictly speaking, can be nothing but an immaterial essence or spiritual mass of God's creation. He governs it; he exists in it, and he is every where!! If a single blade of grass was this moment annihilated, there would probably be a link in the universal chain destroyed, which would not only produce confusion in this earth, but would convulse all the planetary worlds! Nay, if the smallest grain of sand was removed from existence, it might affect the projectile force of the earth, and not only bring it in collision with the sun, but derange the whole starry heavens and all the systems and worlds that lie retired beyond our limits and comprehension.

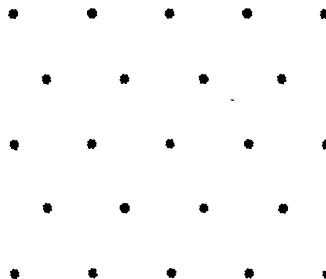
GALEN.

[The writer of the foregoing piece, shows in it more power of imagination than adherence to strict reasoning. Nevertheless, his facts are interesting, and his deductions and arguments may amuse those whom they cannot convince.]

For the Farmers' Register.

ORCHARDS IN ALTERNATE ROWS, OR QUINCUNCX ORDER.

Xenophon thus describes the gallant plantation of Cyrus at Sardis, as rendered by Cicero: "*Arbores pari intervallo sitas, rectos ordines et omnia per puchre in Quincuncum directa*"—that is, rows and orders so handsomely disposed or five trees so set together, that a regular angularity, and thorough prospect, was left on every side, owing this name to the "Quintuple number of trees," as thus figured, viz:



"That the same was used in later plantations, is plainly confirmed from the commanding pen of Varro, Quintilian, and handsome description of Virgil, in his second Georgic. See the garden of Cyrus, &c., by Sir Thomas Brown, of Norwich, M. D."

S.

From Silliman's Journal 1824.

WOOL MORE ABUNDANT IN COLD CLIMATES.

"From their elevation and latitude, the grazing lands situated in the northern part of New England, are best adapted for sheep. The great consumption of fodder incident to long winters, so objectionable to the raising of cattle, is more than compensated to the merino sheep proprietor, by an

improvement in the quantity and quality of wool, which is much affected by climate. In tropical countries, sheep are *dressed* with hair—in more temperate, the wool is generally short and coarse, but longer and finer in cold regions. In Spain, two and a half pounds of wool is the average product of their merinos, and of a quality inferior to ours—in the middle states, and valley of the Hudson, the same; on the elevated ground in the western part of Connecticut and Massachusetts—three, and in some flocks, four pounds. In the southern and middle part of Vermont, from four to four and a half. In Maine the average is five; and in a few choice flocks, six pounds the sheep. The best merino wool of Europe, is from the bleak mountains of Saxony. The quantity and quality of wool is also considerably affected by the food, management and selection of flocks, as nature bountifully provides a dress for all animals according to their wants. Furs are found to be good, and the staple long, in proportion to coldness of climate.

"The northern parts of the United States and Canada, in addition to climate, have for the raising of wool, an important advantage over England, and the south of Europe, in cheapness of soil—much land being required for the support of sheep. The fee simple of good sheep farms in America, can be procured with the amount of the annual rent and taxes of the same quality of ground in England."

From the Athenæum.

RISE OF THE COTTON MANUFACTURE IN ENGLAND.

In the beginning of the reign of George III., (1760,) this trade gave employment to 40,000 persons, and the value of the goods produced was £600,000. It now employs not less than 1,500,000 persons, and the value of the goods produced exceeds thirty-one millions. The cotton yarn annually spun in England would, in a single thread, girdle the globe 203,775 times, it would reach 51 times from the earth to the sun, and it would encircle the earth's orbit eight times and a half.

From the London Morning Chronicle.

HEAT WITHOUT FIRE.

When the properties of steam and its power were first ascertained, it was supposed that human genius could extend no further, still since then we have had our streets and houses lighted by gas, and now we are to have our residences warmed and our provision dressed without the use of "fire, flame, smoke, steam, gas, oil, spirit, chemical preparation, or any dangerous substance whatever." Incredible as this may appear, it is no less true, an ingenious German having invented a machine by which it may be accomplished. It is made of brass, is about 22 inches high, 12 inches wide, and six deep, has the appearance of a miniature chest of drawers, and is surrounded by an inverted crescent, which is hollow for the purpose of containing water. It is called "Wenn's solar stove," and is heated by "elementary heat," produced (according to the words of the inventor) by 'separate and combined elements.' It may be used with the greatest safety in ships, and in manufactories and warehouses, where, in consequence of the combustible nature of the stock, fires are pro-

hibited. The process of heating is so clean and simple, that a lady with white gloves on may perform it without soiling them, or a child three years of age without injury.

Yesterday its powers were exhibited at the West India docks, before Capt. Parish, the dock master, T. Shelrake, Esq. engineer, — Beck, Esq., and a number of other gentlemen connected with the dock company, who expressed the greatest astonishment at Mr. Wenn's invaluable discovery, and said they considered it would be of incalculable service to the navy, &c. Heat was produced by invisible means in less than two minutes, and in three minutes afterwards, water which had been put into the crescent, boiled with such force, that the window of the room in which it was tried was compelled to be opened to let the steam escape. There is a drawer in the machine in which a steak or chop can be cooked in its own gravy, but there not being one at hand, the experiment was not tried. Three hours after it had been heated, from which time nothing had been done to it, it was found to be still so hot that it could scarcely be touched with the naked hand, although it had been carried from the docks to the city. We understand it is the intention of the ingenious inventor, who has expended all he was possessed of in bringing it to perfection, to exhibit it to the public at the museum of arts and sciences, in Leicestersquare.

From the Library of Useful Knowledge, Farmer's Series.

THE SHETLAND HORSE.

The *Shetland Pony*, called in Scotland *Sheltie*, an inhabitant of the extremest northern Scottish isles, is a very diminutive animal, sometimes not seven hands and a half in height, and rarely exceeding nine and a half. He is often exceedingly beautiful, with a small head, good-tempered countenance, a short neck, fine towards the throat, shoulders low and thick, (in so little a creature far from being a blemish,) back short, quarters expanded and powerful, legs flat and fine, and pretty round feet. They possess immense strength for their size, will fatten upon any thing; and are perfectly docile. One of them nine hands, or three feet in height, carried a man of twelve stone, forty miles in one day.

A friend of ours was, not long ago, presented with one of these elegant little animals. He was several miles from home, and puzzled how to convey his newly-acquired property. The Shetlander was scarcely more than seven hands high, and as docile as he was beautiful. "Can we not carry him in your chaise?" said his friend. The strange experiment was tried. The Sheltie was placed in the bottom of the gig, and covered up as well as could be managed with the apron; a few bits of bread kept him quiet; and thus he was safely conveyed away, and exhibited the curious spectacle of a horse riding in a gig.

In the southern parts of the kingdom the Shetlanders have a very pleasing appearance, harnessed to a light garden chair, or carrying an almost baby rider. There are several of them now running in Windsor Park.

It has been disputed whether the pony and large English horse were, or could be, originally from the same stock. The question is difficult to answer. It is not impossible that they might have

one common extraction, and, if we reflect on the effect of feeding, it is not so improbable as it may at first appear.

Mr. Parkinson* relates a circumstance very much to the point, that fell under his observation. His father had a mare that brought him no less than fourteen colts, and all by the same horse, and not one of which at three years old was under seventeen hands. She was in the fifteenth foal by the same horse, when he sold her to a neighboring farmer, reserving the foal which was to be delivered in a twelvemonth. At her new master's she was comparatively starved, and she came back at the expiration of the year so altered as scarcely to be recognized. The foal, four months old, was very small. The little animal was put on the most luxuriant keep, but it did not reach more than fifteen hands at the expiration of the third year.

[Much space has been occupied of late in the British agricultural periodicals by articles on the remarkable and extensive failures in the potato crop. The following is the latest that has been received. We are so ignorant of this culture on a large scale, as not to know whether such diseases as are described, and the consequent losses, have ever been experienced in the United States. But even if not, and the principal value of the following statements should be therefore useless, there will still be found facts and opinions which will be novel and interesting to many.]

From the British Farmer's Magazine.

ON THE RECENT FAILURES IN THE POTATO CROP, AND THE PROBABILITY THAT A PREVENTIVE HAS BEEN DISCOVERED.

By Mr. PETER COWAN, farm overseer, Antrim Castle.

The immense variety of the potato in Ireland is something surprising, seeing that the painstaking and patience-requiring endeavor to raise new sorts from seed, is rarely if ever practised by our farmers. It is probable that there are at least two hundred distinct varieties in cultivation in this kingdom—the kinds grown in one county, being, in many instances, totally unknown in the adjoining one. The distinction in the quality of each variety is also surprising. All the black or dark blue skinned sorts are found to contain more farina than the white colored ones, and housewives always choose the former for making potato-starch. The red skinned sorts also contain a great portion of farina at a certain season of the year. Some kinds when raised in November are so watery and strong tasted, as to be unfit for use at that season, and continue so until the following spring, when their quality becomes totally changed; they are then mild, mealy, and excellent, and so continue through the summer months. Other kinds are in high perfection when dug out in October and November, preserve their good qualities through winter, but become unfit for use towards the month of April. Some sorts are excellent in autumn, cease to be so through winter, but resume their excellence on the approach of spring. In general, the white skinned sorts are fit for the ta-

ble from August to Christmas—the black skinned sorts from October to May—the red skinned sorts from May or June to August. Such a variety in the quality of this root enables families in this country to have good potatoes on their tables every day in the year; a great advantage certainly, but one, the interruption of which has been seriously threatened by the failure in the seed roots of the last and those of the present year. On uncovering a barren drill last season, some of the sets were found quite rotten, while others were perfectly sound, but unnaturally hard. In some of the latter the buds had advanced an inch or two, but, instead of continuing to grow in a regular manner, a small tuber had formed at the end, and the growth of the shoot being thus obstructed, another puny one was seen stealing from the same eye. Some sets, after being in the ground for six weeks, were just making an effort, as it were, to strike. Some had sprung a few inches, but, instead of taking an upright direction, they grew round the set, and were hard and wiry, resembling more the root of a young tree, than a young succulent potato stem. These appearances implied a want of vigor in the bud, consequent upon a morbid state of the juices of it, and of the part of the tuber or set from which it sprung, which led to the supposition that the fountain from which the bud first derived its nourishment, namely, this tuber or set itself, must have been a poisoned one; but how it became so, and over such an extent of country, it was not so easy to say. This year a more general rot took place in the sets, and fewer of them produced weakly plants, and, on this account, the appearance of the growing crop has all along been much better than it was last year.

The cause or causes of this failure have not been satisfactorily ascertained: nothing, however, has arisen to invalidate, but much to confirm, the opinion which I ventured to express last season, viz., that it was caused by atmospheric influence affecting the set through the cut part of it. Among many causes which have been assigned, one or two may be noticed with a view of showing their fallacy.

And first, it appears to me to be perfectly clear, that the failures cannot be attributed to any management of the potatoes when out of the ground, as in the housing or pitting processes, &c., since, in this country at least, that management has not, during the last two years, differed in any respect from what has been customary during the last twenty years. Were any disease contracted by the means used for preserving the roots through winter, would it not show itself in the whole potato, as well as in the cut set? It would unquestionably. But it does not; it is only when the potatoes are cut into sets* that the evil is to be apprehended.

The failure is caused, say some, by the potatoes from which seed is taken being unripened. Now, nothing could be more unlikely than this; for, whatever theorists have said, or may say, practical men know, that unripened, and, consequently, watery potatoes, make the best seed-roots, inasmuch as they always produce the most healthy

* Parkinson on Breeding, and the Management of Live Stock, vol. ii. p. 139.

* Has not the practice of cutting also prevailed previously to the last two years? If so, this objection, in great measure, falls to the ground.—CONDUCTOR.

and the most vigorous plants, this watery matter being the germinative principle; and, therefore it is that farmers resort to mossy ground, or to the hills, for their seed; and, it is by acting on this principle, that market gardeners and nurserymen are enabled to preserve their select kinds of potatoes free from degeneracy. When intended for seed, for themselves or others, they plant them late in the season, or they dig them early in the season; in either case the tubers are not matured, they are watery, the farina has not been developed, and in this way they continue to raise great crops of the same kinds of potatoes on the same ground, year after year. On the other hand, we know that if we choose and use for seed, those potatoes which have grown in good land, have fully ripened there, and which, consequently, contain the greatest proportion of farina, and the least of water, many of the plants will be curled, a general want of vigor will be evident, and the produce will be far inferior to that from watery unripened roots. Indeed, so long ago as 1811, that acute observer and eminent practical agriculturist, the late Mr. Brown, of Markle, N. B., speaking of the curl in potatoes, observes, (see his "Rural Affairs," 2 vols.,) that:—"it appears to be occasioned by an over-ripeness of the plant, whereby its strength or procreative power is so much debilitated as to render it unable to bring forward a healthy plant afterwards." This is farther illustrated and confirmed by the fact, known to all persons engaged in rural affairs, that the rose-end—particularly in the long, flat, kidney-shaped varieties—the rose-end, comprising a fourth or fifth part of the potato, makes better seed than any other part of the root. Boil these potatoes, however, and it will be found that this rose-end, which would make such good seed, is so soft and watery as to be sometimes uneatable, while the rest of the potato is firm, dry, and floury.

As little likely to gain credence among practical men, is the assertion, that the failures have been caused by the attacks of worms, slugs, maggots, or animalculæ. Some people on examining their "missed" ground, found the potato sets had become a rotten, pulpy mass, and the abode of maggots, and thus imagined that they had discovered the cause of the failure, but, as with all putrid substances, this was the effect, not the cause. A potato set may be "riddled," in country phrase, or eaten through and through by slugs, without, in the least degree, affecting the growth of the bud, and this we have frequently an opportunity of witnessing in those sorts of potatoes which are dug early in the season; the tops shall be strong and vigorous, and a good crop of tubers, while attached to the root is often seen the old set which has scarcely begun to decay, though eaten full of holes by slugs, worms, and maggots. If, after depositing the set in the ground, the bud starts from it vigorously, it soon forms its own roots, and as soon becomes altogether independent of the set, which then gradually decays; but never until the plant is established, unless it be affected by other influences.

Another doctrine, lately advanced by Professor Rennie, of King's College, London, is the following:—"it appears to me," says this gentleman, "that paring and burning would be the most important measure which could be adopted in Ireland for purifying the soil, now so overloaded with pota-

to excretions, that extensive failures in the crop are not uncommon."* This theory, however, is at once upset by the fact, that in the gardens of the poor, where potatoes have been grown every year for scores of years, there has scarcely been a failure, certainly not one for ten which have occurred in fields where several crops intervene between two of potatoes. Were the excrementitious exudations from the roots of previous crops of potatoes the cause of the late failures, it would first show itself, and to a greater proportionate extent, in such places as the gardens just referred to, whereas the very reverse of this is the fact. If I am asked how I account for the failures being less in gardens than in fields, I answer—the cottager generally plants his seed as he cuts them, or if he cuts them on one evening, after his day's work is over for his employer, he plants them the next; the ground of his garden, moreover, is generally well dug and pulverized, and this leads me to state a few facts which appear to be confirmatory of the opinion that the failure has been caused by atmospheric influence.

First. When sets have been cut and planted immediately, or "hot from the knife," they have seldom failed, particularly if the cut surface has been turned downwards, and if the second and third precautions have been rightly observed; but when the sets have lain unplanted and exposed to the air for a week or ten days after being cut, the failures have been greater. Second. When the ground has been properly prepared, that is, pulverized and rendered fine, as it ought to be, and the drills rolled, the failures have been less than in badly prepared, coarse, lumpy, open, rough ground; in the latter case, the air was freely admitted, in the former it was excluded; hence the great extent of the failure in heavy clay lands. Third. When the dung was properly decomposed when applied to the ground, so that the covering earth lay close to the set and excluded the air, the failures have been fewer than where the dung, by being green and littery, kept the ground open and admitted the air. Fourth. When the surface of the cut of the set has been covered with some material which excluded the atmospheric air, the sets have grown, although they remained unplanted for a considerable time after being so operated on, but those sets which were not treated in this manner, entirely failed.

I was led to make a number of experiments this season with a view of discovering a preventive, but that just stated is the only one which has been attended with complete success. Recollecting that whole potatoes do not fail, I bethought me of making the sets equal to whole ones, by putting a skin of some sort on that part of the set which was bare; this I effected completely and quickly by a little floured lime. I collected a quantity of middle sized potatoes, and set a careful man to work, who cut each potato into two, cutting through the rose end; he had a little floured lime before him, (it was quite cold, having been some days slacked,) into which he pressed the cut surface of the sets before he laid them (the sets) out of his hand; when limed in this way they were put to one side. I found that a sufficiency of lime adhered to the moist surface of the cut, to form, when dry, a cake over it, about the sixteenth part

* Quarterly Journal of Agriculture No. xxv., p. 22.

of an inch in thickness, which seemed to exclude the air completely. Four bushels of sets were so treated. Other four bushels of the same potatoes were cut on the same day, but not limed, and both parcels lay on the floor of an open shed for eighteen days afterwards; they were then planted. The result appears to be worthy of observation. It was this. *Among the limed sets there was scarcely a failure—among the unlimed sets there was scarcely a plant*, and the ground had to be sown with turnips. I did not take any note of the quantity of lime used, or of the additional time required to lime the sets, both being so very inconsiderable, that even on a large scale the extra expense would be trifling. The kind of potato with which the experiments were made was the black seedling.

I stated, in the commencement of this paper, that the red skinned sorts of potatoes contain a great proportion of farina at a certain season of the year; this season is included in the months of May, June, and July, and upon the principle formerly laid down as to what is the germinative property, it will be easy to account for the greater failure which, it is known, has taken place among the red sorts of potatoes, than among any of the black or white varieties. The red rose, a kind much in use in this part of the country, failed to a great extent. This sort is excellent during the three months named; it is then extremely firm and floury on the dish, more so than at any other season of the year. This very circumstance, however, operates against this kind producing vigorous plants, because, when there is little watery matter present, but much farinaceous matter, as we have seen is the case with these red sorts, and exactly at the season of planting, (May,) the plants produced are necessarily weak, because the stimulus to germinative action, if I may so speak, does not exist. Hence, in the most favorable seasons and situations, we find these red roses always producing weak plants at first, although they become stronger as the roots extend. It is easy to conceive, therefore, that if sets of this variety, unprotected on their cut surfaces, were exposed for a considerable time to a dry atmosphere, the little watery matter which they contain would soon evaporate, and the germinative principle become totally inert. When failures in this variety were taking place all around me this season, I procured one bushel of them, cut them, and limed the cut surfaces—planted them, and *not a single one failed*. They may be seen at any time. I must here mention, however, that in cutting them I found so little moisture on the cut surface, that the lime would scarcely adhere, but there being fine mortar at hand, I put some upon a slate and rubbed the cut surfaces on it; this formed an excellent skin when dry, and was attended with complete success, as above stated.

Whether, therefore, the failures be or be not caused by atmospheric influence—for I hope it will be observed that I do not assert they are—I make no assertions; I use the words "if"—"opinion"—"probability," &c. Whether, I say, the failures be or be not caused by atmospheric influence, there appear to me to be three methods of prevention, either of which may, I think, be adopted with success; and on this head I can speak with confidence. Presuming, always, that the land has been properly wrought and pulverized, and the

manure sufficiently decomposed—one method is, to plant whole potatoes, but it is certainly an extravagant one—if cut, to plant immediately afterwards, turning the cut side downwards—or, if not planted immediately, to use lime on the moist cut surfaces, in the manner described, which has been attended here with extraordinary and decided success, and is a practice I would strongly recommend, where circumstances render immediate planting impracticable; in this case the lime prevents the escape of the watery matter, and preserves the set fresh and vigorous for weeks. But when immediate planting can be adopted, and the land thoroughly prepared, liming is, perhaps, unnecessary.

CHOOSING SHEEP FOR BREEDING.

One of the two species of sheep, the long and the short woolled, having been chosen, as most appropriate to the situation, and wool being made an object, it is most advantageous to select such flocks as are pure as possible of the species to which they belong, and not a mixture of the short and long woolled breeds, which must generally produce an inferior fleece, disadvantageous to the manufacturer. Length of staple in the long, and fineness, elasticity and closeness in the short woolled fleece, will be the best guides in this case.

Whether the wool be long or short, the carcass of the animal ought to be amply and regularly covered; it is a great defect when the belly is bare, and a still greater when the wool is thin and open along the ridge of the back, admitting rain and moisture to a most susceptible part, indeed to descend upon all parts of the body.

It is a piece of good old advice to buy your rams a little before shearing time, if possible; and a very necessary modern addition to take the opportunity of purchasing at the farmer's house while you can see the animal in *pursu naturabilibus*, and before he has been decked out and trimmed for show by the sheep barber. A thick fleece, covering all parts with as much equality as possible, containing plenty of *yolk*, or retained or inspissated perspiration, is the object. If ewes, equally well bred, can be procured, the shepherd anticipates and reaps an immediate benefit; if not, he must patiently await improvement of his wool, through the medium of the superior blood of his rams.

At *shearing time*, examine the bottoms of the fleece, or the lower extremity of the filaments of wool; if it be *stichy-haired*, of mixed quality, or if the sheep have a coarse breech, or be not well covered, it must be rejected, as improper for a breeding stock, where it would perpetuate its defects. The quantity of *yolk* or grease is a good proof of the thickness of the fleece, since, by the closeness and thickness of the wool, the grease or perspirable matter of the animal is retained; hence fine, closed, curled wool has ever the greatest quantity of *yolk*.

—*Bath Memoirs*.

From *Waldie's Fort Folio*.

NATURAL GAS WORKS.

A most remarkable fact is stated by the Abbe Imbert, who visited China a few years since. By means of tunnels of bamboo, placed in communication with fountains of carbonated hydrogen in the bowels of the earth, as many as three hundred

cauldrons are supplied with heat for boiling. Streets, halls, work-shops, are all lighted by this gas, which is the same used in all artificial gas works. Arago says that *several villages* in the United States have long been supplied in this manner. This expression is a little too strong, though it is true, we believe in respect to Fredonia, on Lake Erie, where the light-house is also supplied in this way from natural sources. In Ontario county, near Cacandagut, there are also several of these gaseous emissions from the surface of the earth. They are called, in common parlance, "Burning Springs."

For the Farmers' Register.

AGRICULTURAL PROSPECTS OF VIRGINIA.

In viewing the effects of the system of agriculture pursued in eastern Virginia, the most careless observer will be struck with surprise, in comparing the small proportion of land in actual cultivation, with that which is lying waste and unimproved: and it will be increased still more when he reflects how small a part of the farm is regularly manured and kept in good condition, and fit for tillage. None of the farms afford manure enough to replace the produce taken from the fields, and keep them constantly increasing in fertility. The small quantity which is saved from the stable, farm pen, and other sources being insufficient for the farm, is generally applied to the tobacco lots, or some favorite spot, while the rest of the farm is neglected, though perhaps regularly cultivated and grazed, or permitted to lie waste, yielding nothing but a scanty subsistence to a few half-starved cattle. The fences being thrown down, it soon becomes common pasturage, gullied, or grown up in pine barrens; its owner is restricted to a narrower limit in his system of exhaustion and destruction, until becoming too much confined, or too much indebted, he sells out, and removes to a more fertile and cheaper soil in the west. Thousands are travelling the same road urged by the same causes. The educated, active, and enterprising young men, despairing of success with this example before them, are leaving the state very rapidly, to seek their fortunes in the west and south; and besides all this, the traders are carrying off our slaves in great numbers, and thus annually diminishing in the ratio of the numbers carried off, the quantity of produce which would otherwise be made, and the prosperity of the country. The tide of emigration is regularly increasing from all classes; as if the angel of desolation had cursed the land, and imbued the people with a hatred to the place of their nativity. Even national pride will not make us dispute the facts, however much the patriot and philanthropist may lament their existence. I propose to inquire what causes led to this prostrated condition of agriculture; and whether they will probably be permanent, or are they merely temporary—and to suggest some remedies for existing evils.

The present exhausted state of the country has been generally ascribed to the employment of *slave labor*; which, it is said, will always arrest the progress of improvement, because the slaves have not the capacity, nor do they feel interested to become skilful in their occupation. But the slovenly and negligent management visible on most farms need not necessarily belong to the state of

slavery existing among us, as is proved by the high state of cultivation of the lands on James river, and in various small sections of almost every county in eastern Virginia. There is scarcely a person who is not acquainted with some farms cultivated to the very best advantage; and these exceptions prove that bad management, though a general, is not a necessary attendant upon the employment of slave labor. It can, therefore, offer no material obstruction to improved and successful cultivation.

The progress of rapid improvement has been opposed by that attachment to old customs, and disinclination to change old plans, which are almost as strong feelings with us as in those countries where it was regarded and punished as sacrilege, to depart from the occupation of their fathers. The first settlers of our state exhausted one piece of ground by continual cropping, then cleared and tilled another piece of fresh land; and when that was exhausted, proceeded to a third. They preferred this, to raising manure, when land could be purchased for a few shillings per acre, and perhaps it was the cheapest course. Yet when lands have risen in value, and there is no reason to justify the same system of husbandry, it still prevails in many places, and is followed, "because their fathers made money in that way." The west, however, is now their resort, after ruining one piece of land by this destructive course.

In a republican government, where the highest offices are within the reach of superior talents and acquirements, the genius and talents of the country will be naturally directed to politics or some of the liberal professions. The undeserved success of some, possessing humble abilities, and the vanity of others, induce many to pursue these professions; and almost every farmer who has educated his son liberally, sends him to "study the law"—where there are more than twenty chances to one, against the probability of his success; and the prospects of failure and disgrace exactly in the reverse ratio. He hangs on at the bar for several years, perhaps idle, dissipated, and a nuisance to society; leaves it disheartened, and in debt—unfitted for the pursuit of agriculture, and too proud to enter into business. If he succeeds, honor makes the greater part of his reward, and his profit comes in slowly at the latter part of his life. In agriculture, his success would have been certain; but his father thinks his education must not be lost upon him—and prefers to hold him up to public contempt, than bury him in the obscurity of a farm. Whether he has natural abilities, or the requisite acquirements; even if nature has manifestly fashioned him for other pursuits, by giving him a strong body and a weak head, still he is destined, from his cradle to "study the law." Hence, the greater part of the education and talents have been diverted from this employment, and directed to some of the liberal professions, which has retarded the improvement of agriculture; latterly, however, many of our distinguished and highly gifted citizens are giving it their attention.

These prejudices are more easily overcome than those unavoidable obstructions, which in the nature of things, oppose the introduction of an improved system. Some capital must be expended in order to commence, as both labor and capital are as necessary in the rapid improvement of exhausted lands, as in the rebuilding of dilapidated houses. 'Tis true, in the progress of time, re-

quiring longer and longer periods, as the land is more and more exhausted, that land will become comparatively fertile by its own inherent recuperative powers; but this process is slow, frequently exceeding half a century.

To attempt improving with the hope of success, the fields must be laid off into separate shifts, drained, clovered and plastered, if the nature of the soil is suitable, and the manure collected and saved by great labor and attention.

Most of our farmers are in debt, and compelled to have immediate returns for the discharge of those debts; all of their available labor and funds must be applied to that end; and to effect it, they are forced to cultivate the richest spots, which yield the greatest profit—leaving out the poorest shifts that produce little or no nett income to pay off pressing demands. They are not able to spend their money in purchasing clover seed and plaster, nor their labor, in manuring the poor shifts, draining, enclosing, and reducing the farm to a proper state. They must overcome these difficulties by a long course of economy and industry.

Besides these natural difficulties, which are incident to the cultivation of every country, there is one which is peculiar to our own state, and has generally been overlooked. I refer to the demand for slaves in the west and south, which materially affects the prosperity of our own state. It has been generally supposed that this demand, by raising their price in our own market, would be highly advantageous to the country: and it would undoubtedly be so, if there were a superabundance of slaves for the cultivation of the whole of our lands, and a consequent overplus of labor after the highest state of improvement. In such a state of things, which could not have occurred in the course of half a century, and probably never would, the most fertile lands must have risen so high, that it would be an object to cultivate and improve those of a poorer quality, until a denser population and a constantly increasing demand would compensate the farmer for the improvement of the poorest soils. The greater the quantity of produce annually made in any country, the greater must be its profits, and consequently, its prosperity; and the greater the quantity of labor which it can command or is employed in it, the greater must be that produce. Hence, whatever detracts from this quantity of labor, equally reduces the prosperity of the country, unless it is overstocked with population. In this view then, it must be prejudicial to the interests of the country to carry into another state its laboring population.

But regard it in another aspect. It is well known to every person, that the greater fertility of the soils in the west and south, their suitability to the production of cotton and sugar will always enable the farmers of those sections to give a higher price for negroes, than the farmers of our own state—for the simple and obvious reason, that they can make larger profits from the produce of their labor. These profits, other things being equal, are almost always greatest in newly settled countries; and are here greatly increased by the superior fertility of the soil, and the enhanced value of its productions. So much larger are the profits of slave labor there, that they sell for nearly double the price which we can afford to give for them.—The effect of this is already plainly perceptible; our slaves are carried there by thousands, and we

cannot even enter into competition with them for their purchase. At sheriff's, executor's, and administrator's sales; in every sale where the cupidity or necessity of the owner makes him ask a high price, or if the slave is forced into market, he is purchased almost invariably by a trader. As the number of slaves diminishes, the demand for their labor will increase according to their scarcity, both at home and in other markets, until they become so dear that little or no profit can be made by purchasing them on the richest farms—and none whatever on those farms of a poorer quality. The traders will continue to purchase and to give high prices, and to rise in their bids, until the owners of poor lands first, will be thrown out of competition; then the owners of the next best lands, and so on, until the farmers on the richest and best improved estates will not be able to give the exorbitant prices and realize any profit. The farmers having poor lands will see that they can make greater profits by selling than by working them; hence they will sell all they can spare, stop the cultivation of the poor shifts and confine themselves to the richest spots; the residue of the plantation being left to waste and lie unproductive. Such must be the fate of all the poor spots when the wages of labor are too high to enable the farmer to make some profit by working them; for it is absurd to suppose that any person will employ his capital or his labor, where it yields him no profit. Their price here is not regulated by our profits, but by the profits of their labor in other states. If tobacco falls to four dollars a hundred, and wheat to fifty cents a bushel, it would cause no fall in the price of negroes—for they are already far above their value in our own markets, according to the present prices of our produce. The variations in the price of our produce, the decline or improvement of agriculture in this state, will not affect their price so long as cotton and sugar continue high. Their value is regulated by the articles produced in other states—their price here, by the competition of the traders to those states; and if we made no profit by their labor they would sell no cheaper, for the traders could get just as much for them as if our tobacco and wheat sold high. We must regard their value as fixed, and dependant upon the price of produce, not of our own, but of others. There will then, be two values for the same slave throughout our state; his *nominal* value, or what he is worth to the trader, which depends on the price of the produce of the west and south—his *real* value, or what he is worth to one of our farmers, to be employed here, which is much *below* the trader's price. We must, however, always give more than the *real* value for the negro, because we have to bid against the trader. What then, must be the necessary consequence? As we are, from adventitious circumstances, compelled to give more for negroes than they are really worth, and as this high price is entirely independent of the profits of their labor, their profits will be diminished. The farmer here will make smaller profits by agriculture upon all qualities of land, which cannot, for the reasons before stated, make the slaves fall in price. For however small his profits here, that does not lower his price. The value of land must of necessity be reduced when the profits derived from its cultivation are lessened from any cause; capital will in consequence be withdrawn from that employment and invested in more productive

stock. The poorest shifts, yielding the smallest produce, will first be turned out of cultivation, instead of being reclaimed or improved. And while the general profits of farming are lessened, the farmer, so far from being compensated for improving his poor land, is scarcely rewarded when working his richest. When there are any two markets for labor in one of which double the price can be given, which can be afforded in the other, it is self-evident, that the labor will always be purchased where its price is the highest; and the market which cannot afford to pay so high, will always be depressed under the disadvantage of having to pay for labor higher than it is worth to them, and thus deduct from their profits. Thus the western and southern markets for our slaves, offer the greatest and most serious obstruction to the progress of improvement. How this is to be obviated, will be examined in the next number.

A PLANTER.

*Ashland, Halifax, Va.,
Feb. 5, 1835.* }

From Hood's Comic Annual.

PLEASURES OF THE COUNTRY, FOR YOUNG
TOWN GENTLEMEN.

*Letter from a boy, a new resident in the country,
to his friend in London.*

* * * * Now, Bob, I'll tell you what I want. I want you to come down here for the holydays. Don't be afraid. Ask your sister to ask your mother to ask your father to let you come. It's only ninety mile. If you're out of pocket money, you can walk, and beg a lift now and then, or swing by the diekeys. Put on cord-roys, and don't care for the cut behind. The two prentices, George and Will, are here to be made farmers of; and brother Nick is took home from school, to help in agriculture. We like farming very much; it's capital fun. Us four have got a gun, and go out shooting; it's a famous good un, and sure to go off if you don't full cock it. Tiger is to be our shooting dog, as soon as he has left off killing the sheep. He's a real savage, and worries eats beautiful. Before father comes down, we mean to bait our bull with him. There's plenty of New Rivers about, and we're going a fishing as soon as we have mended our top joint. We've killed one of our sheep on the sly, to get gentles.* We've a pony, too, to ride upon, when we can catch him; but he's loose in the paddock, and has neither mane nor tail, to signify, to lay hold of. Isn't it prime, Bob? You *must* come. If your mother won't give your father leave to allow you —run away. Remember, you turn up Goswell street to go to Lincolnshire, and ask for Middlefen Hall. There's a pond full of frogs, but we won't pelt them till you come; but let it be before Sunday, as there's our own orchard to rob, and the fruit's to be gathered on Monday. If you like sucking raw eggs, we know where the hens lay, and mother don't; and I'm bound there's lots of bird's nests. Do come, Bob, and I'll show you the wasp's nest, and every thing that can make you comfortable. I dare say you could borrow your father's volunteer musket of him, without his knowing of it; but be sure any how to bring the ramrod, as we have mislaid ours by firing it off.

* Carrion maggots for bait.

REMARKS ON THE STATE AND PROSPECTS OF
THE FARMERS' REGISTER.

Addressed to correspondents and subscribers.

As this number of the Farmers' Register will complete the second volume of this work, and close the two years that have been devoted to its support, the occasion will be used to offer some remarks on its condition and prospects. These remarks are the more required, because the value, the reputation, and the permanency of this journal, are principally due to the efficient aid of its correspondents. The editor has never ceased to feel, and to acknowledge, that without the aid which he has received from the pens of others, he could have done nothing. It was the fear of not being able to draw forth such aid, which rendered the undertaking at first most hazardous in his own opinion—and almost desperate in the opinions of most of his friends. But the result has been far better than even the most sanguine hopes had anticipated. More than 170 individuals, mostly cultivators of the soil, have already been induced to contribute to the original contents of the Farmers' Register, without including any of those whose letters have merely furnished published extracts from private correspondence. When this fact is considered, in connexion with the well known repugnance of farmers to writing for publication, it will be admitted that, in this respect, the undertaking has been remarkably successful. There are accessions to this list in every new number, and a general increase of the whole quantity of original matter, furnished by old and new correspondents.

As the far greater share of the value and usefulness of this journal justly belongs to its correspondents, the editor may be permitted to speak of its effects and beneficial influence, without being considered as claiming but a small share of the merit of sustaining its existence. But however small may be that share, he is far from affecting to hold it as of light value: on the contrary, it is a subject of pride and gratification, as constituting the greater part of those few acts of his life, that may have some lasting influence on the welfare of his country. Every correspondent who has added some value to the contents of the Farmers' Register has a right to enjoy a greater or less share of the like self-approbation: and the more such feelings are cherished by all, the more likely it will be, that there will be a continued and increasing accumulation of beneficial results, derived from their combined efforts.

With means thus afforded for obtaining and diffusing information, this journal has done much for the benefit of agriculture. The knowledge of numerous opinions and practices, before confined within narrow limits, has been extended over a wide region: increased attention to the improvement of soils and of tillage, is beginning generally to be given: proper views of legislative oppressions on agriculture are spreading, and beginning to operate—and even already some valuable results of this new state of things are seen in the late proceedings of the legislature of Virginia, which may be considered as auguring still more extended and beneficial action for the development of agricultural resources, and the guarding of agricultural interests,

But however useful may have been the combined efforts exhibited in the pages of this journal, the benefit as yet has been very small, compared to what may be obtained by more general exertions: and extensive as is the list of contributors, there are far greater numbers among the subscribers who might render in that way great service, and to all of whom this journal is not yet indebted for a single communication. Let all such persons but follow the good example of others, and nothing more need be required to assure the speedy doubling the value of the contents, and far more than doubling the circulation and beneficial influence of the work.

The subscription list has continued to show a slow but steady increase. At the close of the first volume, more than one hundred names were withdrawn. This was less than had been expected—as (besides all other reasons) many persons will aid the commencement of a new work which they deem of public value, without feeling any personal interest in its contents, or intending to continue subscribers longer than a year. This loss has been more than made good by new subscriptions. The present number for Vol. II. and commencing with its beginning, is not much short of 1400 copies, and the greater part of all new subscribers have also taken Vol. I.—which demands have nearly exhausted the impression of 1500 copies of that volume. The principal support from subscriptions is still derived from the eastern half of Virginia—and very little has yet been furnished west of the Blue Ridge Mountains, (except the county of Rockbridge, which has given a liberal support,) or from any other states except Maryland, North Carolina, South Carolina, and Alabama, each of which gives a moderate and growing subscription. Even in the region in which the work is best supported, there are particular counties which give very little aid. Nothing is wanting to obtain subscribers in all the places where there are now few or none, but some exertion from men of influence, who will make the existence and character of the work known, and thus induce the addition of new names. In every neighborhood where it is known that some one individual has already so labored for the success of the work, there has been obtained a good and enduring support. But without such aid, the usefulness, and even the existence of an agricultural journal becomes known very slowly. The editor pretends not to any personal claim for such favors—but he presumes to ask some such exertion of the influence of every one of his present subscribers who believes that by supporting the Farmers' Register, he is promoting the agricultural improvement and general prosperity of his country. A full, though not direct return may be made to subscribers from such aid. Various improvements of the work are under consideration, and will be made as soon as its increased income may permit—such as a more frequent use of engravings—more extended sources of information from foreign publications—the offering of premiums for experiments, &c.—the employment of competent persons to make personal examination, and prepare reports of well cultivated farms, or districts—and either increasing the size,

or lessening the price of the publication—all are objects in view, the attainment of which will depend on a sufficiently augmented subscription list. There would be nothing more interesting, or valuable, than the publication of full and correct reports of the practices of particular farms, or of larger districts, distinguished for good husbandry—and the desire has never ceased, to present something more of that kind than has been done already. This intention has been delayed only because of the difficulty of employing competent tourists and reporters, and the want of sufficient profits to make adequate compensation for such valuable services. The aid and the purse of the commonwealth would be required, and ought to be given, to obtain full and correct agricultural reports of the various sections of Virginia. Nevertheless, even by private and individual efforts, it is hoped that some such materials may be collected—some fragments exhibited as specimens of the value of a general and complete report of the agricultural practices, improvements, and resources of the country.

Many public spirited individuals, who are not land holders, have become subscribers to this work, who, of course, can derive no direct profit from the publication. But in the great majority of cases, its supporters are practical farmers, or land holders—and for all such, the assertion may be hazarded, that every one derives from its contents a direct pecuniary return, at least equal to his expense—and in many cases surpassing the cost an hundred fold. If this view of the subject was fairly taken, and the question of supporting the work could be placed on this footing, nothing better would be wanting for its success: and no greater number of subscribers need be coveted, than those who might (and would, if they were readers,) derive as much instruction as would at least repay the value of their purchase money.

At the close of a volume many withdrawals of subscriptions must, of course, be expected. Of those subscribers who may determine to withdraw their support, it is requested that they will make the annunciation as soon as possible—and at any rate not postpone it until the commencement of another year of publication leaves them no such power. The requisition of a timely notice of every discontinuance *must* be uniformly adhered to: and to this, as well as to every other condition of the terms of publication the particular attention of subscribers is again earnestly requested.

With this No., accounts will be sent to all persons who are now indebted for two years' subscription.

The payments for subscriptions, have in general been made with uncommon punctuality—and without any solicitation by collectors, or otherwise, except the sending of a bill to those only who had not paid for the *first year*, after seventeen months from its commencement. But while thanks are due to much the greater number for their marked attention in this respect, there are still more than 200 who have received the work from the commencement, without having as yet paid any thing for their subscription. Some of these we know to be wealthy men, or otherwise of

the most perfect responsibility, and in whom this omission has been caused solely by forgetfulness of such small matters—and perhaps there are very many such who are not known. We shall be very unwilling to act (but yet know not how to avoid it,) in the same manner towards this class of debtors, and those persons who subscribed “merely to encourage the work,” without caring to read, or intending to pay for it. It will be absolutely necessary to erase the names of all who continue in arrears through two volumes, and who are not known to be responsible debtors: and if in so doing, we should include persons for whom that measure was not required, and whom we should be sorry to offend, they ought in justice to acquit us of the blame, and take it to themselves. But whatever reduction of our list may be made in this manner, even should it prove a permanent diminution, it will leave the publication more clear profit than heretofore, when issuing to many more non-paying subscribers, who have swelled the profit of the work only in appearance, and diminished it in reality. The claims on the few and widely scattered subscribers in other states, are merely *debts of honor*, not secured by any legal responsibility—for they are seldom worth collecting by law, and must be generally lost, unless paid voluntarily.

INUNDATED LANDS OF LOUISIANA.

It is stated in the New Orleans Advertiser that upwards of *five millions of acres of land* in Louisiana are subject to annual inundation, and that that amount comprises about one-sixth of the entire territory of the state. From the same paper we learn that the gross amount of land under cultivation does not exceed forty thousand acres, the annual product of which is about ten millions of dollars, or an average of two hundred and fifty dollars per acre. In view of these singular and striking facts, the editor urges the necessity of suitable efforts to reclaim the inundated lands, the profits arising from which would, he contends, be enormous.

FLORIDA COFFEE, NEITHER OKRA NOR COFFEE.

To the Editor of the Farmers' Register.

Columbia, S. C. April 10th, 1835.

I see by your Register for this month, a short article on the Florida coffee, the writer of which presumes it to be okra seed. But he is mistaken: it is neither okra nor coffee. Persons who have had it prepared as coffee, tell me that it does not taste much like coffee; but is, they think, richer, and that the taste is such that it is probable people would become fond of it. It was awkwardly done in the person who sent a quantity of the seed to this country for sale, that he did not send the botanical name of the plant, nor a description of it. As I have planted a little, I shall soon see what it is. Although the price of the seed was very high, \$2 per pound, it seems to have excited here a great deal of curiosity, and I believe there was not seed enough for the purchasers. It was wrong also in the gentleman to have announced it as coffee, giving to understand that it was an annual species of it; for it does not follow that,

because it is not coffee, it is without value, which is an objection made by some persons. But is coffee the only good thing of which a good morning and evening drink is made? Tea and chocolate are not coffee, and yet they are deservedly held in high estimation, and why should there not be another added—only call it by an appropriate name. Should, however, this plant prove worthless as a substitute for coffee, if the gentleman's account of it be correct, and I have no reason to doubt its being so, it may prove very beneficial in a totally different interest. The plant is said to grow in poor land, old cultivated land, (and I presume that it grows still better in rich soils,) that it yields a very great abundance of foliage and stems, and thereby returns to the ground more than it takes from it. If it be so, we have found what I have long considered a desideratum in agriculture, viz: a plant to turn in the ground for manure, which cattle will not eat—for, as I know by my own experience, if a plant intended for this purpose is good fodder, it will be more likely to be cut for the latter purpose, than buried for the former. I send you a few seeds of it that you or some of your friends may try whether or not it will grow well in your state. Pray send my old friend H. B. Croom, a few of the seeds of the Florida coffee, that he may see it is not okra. It was not till I came to this part of my letter that I found the communication was from Mr. Croom.

N. HERBEMONT.

N. B. Okra or oera seed is worthless as a substitute for coffee.

From the New York Farmer.

ON STOCK FOR THE DAIRY.*

Live stock, including horses, neat cattle, sheep, and swine, is as important a subject as any to which the farmer's attention can be directed. That there are distinct breeds of various and peculiar properties, which render them adapted to the different purposes of labor and food; that all of them under proper management, are susceptible of improvement; that by judicious crossing, comparatively new breeds may be formed, certain desirable properties be extended, increased and propagated, and what we deem defects or faults, remedied or entirely abolished, are points so well established in respect to all the animal creation, so entirely confirmed by experiments within the knowledge of every man who has any pretensions to intelligence, that it would be idle to waste one word in attempting to establish them. That like tends to produce like, and that physical, intellectual, and moral qualities are transmitted from the sire to his offspring, are among those established laws of nature which common observation ascertained long before science attempted to explore, and teach their wide and universal operation; or experiment, with unhesitating confidence ventured practically to apply them.

The farmer who disdains or neglects these established truths, or who fails to act upon them let the sphere of his operations be as humble as it may be, is blind to his true interest, and can lay

* The writer of this piece is the Rev. Henry Colman, one of most distinguished agriculturists of Massachusetts. ED. FARM. REG.

no claims to his rank among the class of careful and intelligent husbandmen. The attempts and generous efforts, therefore, of these public spirited men who have sought to avail themselves of the long experience and extraordinary advances of older countries in the improvement of their domestic animals, and with the most praiseworthy liberality to spread these advantages among us, entitle them to high regard, and justly place them among the benefactors of the community.

It is with these views, with sentiments of gratitude and respect, that I have regarded the liberal, and in many cases the entirely disinterested exertions and expenditures of gentlemen in various parts of our country, to introduce the best breeds of neat cattle from abroad, and to extend their advantages as widely as possible; and it is with ineffable contempt and disdain that I here the sneers which the malignant, narrow-minded, and ill-bred, cast upon such patriotic services, and to which I am sometimes compelled to listen. It cannot, however, be demanded, that we should hail every innovation as an improvement, or that we should admit without ample inquiry, and the severe test of actual experiment, and exact comparison, that the introduction of any foreign breed of animals, with a view to propagation must be an advantage. This is a question of fair discussion, and one which is to be settled, not by any imaginary or conjectural standard—not by theories, however plausible—not by mere guesses, or vague reports, unattested by competent authority; but by direct examination—by simple, authenticated, and incontrovertible facts.

From the first time I ever saw one of the fine animals of the Improved Durham Short Horns, I have been an admirer of this beautiful race, not only for the symmetry of form which they present, but for the wonderful success which has followed the skill, perseverance, and enterprise of those breeders, who have boldly attempted to form and propagate a race of animals after their own *beau ideal* of excellence. It has been my good fortune to see many of the choicest specimens of this noble race which have been brought into the country, and of those which have been propagated from them since their arrival, at the cattle shows at Brighton, Worcester, and Albany; in the establishments of private individuals—at Salem, in the possession of E. H. Derby, Esq. to whose care were entrusted the magnificent animals, Admiral, and Flora, sent as a present to the country by Sir Isaac Coffin, whose munificence is above all praise; at Col. Jacques', in Charlestown, who had in his possession Cœlebs, and the matchless bull Bolivar; at the late Mr. Williams', in Chelsea, who had a numerous herd of them; at Hon. John Wells', in Dorchester, who had several valuable cows; at Gov. Lincoln's in Worcester, who was justly proud of Denton's progeny; at James D'Wolf's, Esq. in Bristol, whose cows with their deep udders were magnificent; at Henry Watson's, Esq., in Windsor, where I had the pleasure of seeing the celebrated bull, Wye-Comet; at Charles H. Hall's, Esq. in Harlem, whose Short Horns, and whose Devons, a present from the fine stock of Mr. Coke, contended for the palm of excellence; at Powelson, at the establishment of the most liberal importer and most devoted advocate of this fine race, whose admirable animals were a perfect justification of the enthusiasm with

which he regarded them; at Albany, where besides various fine specimens of the stock from different individuals, (whose names, as I saw their animals, but not their owners, only at a public show, I shall be pardoned for not remembering,) I had the gratification of seeing Mr. Van Rensselaer's extraordinary bull of two years old, and Mr. C. N. Bement's imported cow, whose superior in promise and general appearance I have never yet seen; at Messrs. Percy's and Rogers', at Hoosic, N. Y. whose stock is admirable, and have been managed with great care; and at Hyde Park, at the noble establishment of Dr. Hosack, where without question, judging from the actual inspection of their yield of milk, as well as their general appearance, I found the most numerous and finest family of Short Horn cows that I have seen, or which, indeed, I ever expect to see; and a bull whose splendid form gave him a just right to preside over such a seraglio.

Greatly, however, as these opportunities have contributed to my personal gratification, I shall not assume the character of a practised, or in any measure a competent judge. I hold myself as no other than a plain inquirer after truth; much as I have admired their appearance, and delighted as I have been with the encomiums which I have heard passed upon them, and not doubting in any case that great advantages are to result from their introduction into the country—if no other, the great one of seeing what can be done in such cases by human skill and perseverance—still I wait anxiously for more facts before I make up my judgment as to the extent of these advantages, and in what particular respects these advantages are to be found. I am aware that I am approaching an exciting subject; I recollect with sorrow the angry collision into which two highly respectable gentlemen were brought on this very matter, and the fear of kindling again in others these slumbering, may I not rather hope, these extinguishing fires, has long deterred me from entering upon it. I shall not willingly, however, provoke hostility; I shall engage in no controversy. If there must be contention among the short horns and the long horns, let the cattle settle it among themselves. I go into the field unarmed, and as a non-combatant.

There are various points yet to be settled in respect to these cattle. Their early maturity, a most valuable property, seems to be determined. That they are great consumers is equally admitted. Their general tendency to keep themselves in high condition is not so well settled. In Brighton market they do not sell so well as our native stock, because, as it is believed there, (I have it from the highest authority,) they do not *prove* as well—that is, do not have so much tallow. It is obvious they can have had but few samples for trial, and those not perhaps of the best kind; there must have been very few indeed if any, of the pure blood. But a matter which I deem of great importance, especially to the northern section of the country, is whether they are preferable to stock already to be found among us for dairy purposes. Here it is we want facts; exact, authentic, and well established statements of the quantity and quality of their milk; how much milk has been obtained from them; how many pounds; how many quarts; whether beer or wine measure; how much butter and how much cheese has been obtained from

them in a given time; and how at such times they have been managed and fed: and as, in such a case as this, the public advantage ought to be our only object, and the truth must in the end be equally important to all, we respectfully ask gentlemen, who possess these fine animals, to make these experiments and examinations and fully report them; that if it should appear they are as valuable for dairy purposes as has been represented, the agricultural public may know what a blessing is within their reach; but if it should be found that they are not so productive as animals which have long been possessed among us, we may be induced to further, by more judicious selection, and more faithful and liberal keeping, the improvement of our own native stock.

The only decisive experiment, which has come within my knowledge, is that of a cow, called Belina, owned by John H. Powell, Esq., Philadelphia, from whose milk, in three days in May, 1827, eight pounds thirteen ounces of butter were obtained, which would be equal to twenty and one-half pounds per week. This is an extraordinary yield, but it will be perceived that it was a very short trial, and that it was only an individual example. It were greatly to be wished that this public spirited gentleman had given the public further results of the same cow, and likewise the results of similar experiments with others of his noble animals. My own experience with this stock has been singularly unfortunate. I have had seven of them, some full blooded and others half blooded, from Celebs, Admiral, and Denton; and, for the quantity and quality of their milk, they have been very inferior, I had almost said worthless, even under every advantage of keeping and attention. I by no means, however, consider my own experience as conclusive; as I know some who have been more fortunate, and I am myself determined upon further trials.

In the absence of this desirable information respecting the produce of the improved Durham short horns, I shall undertake to give some examples of the produce of our native stock, which are well vouched, and many of which have come under my own observation. They may serve at least as matter of entertainment, if not of useful instruction.

1. A cow owned by C. Oakes, Danvers, Mass., 1816.
In 1813, made 180 lbs. butter.
1814, " 300 " "
1815, " over 400 " "
1816, " 484½ " "
In one week this cow produced 19½ lbs. butter, and averaged sixteen pounds per week for more than three months.
2. A cow owned by — Nourse, Salem, Mass., 1824, and afterwards by Col. Pickering. This cow made upwards of twenty pounds one week, and averaged over fourteen pounds per week for four months.
3. Cow—Wheeler, Framingham, Mass., 1821. Eleven pounds butter in one week. 13 beer quarts at one milking.
4. Cow—N. Sanderson, Waltham, Mass., 1828. Thirteen and one-half pounds butter per week through the season, on an average.
5. Cow—John Barre, Salem, Mass., 1823. Average yield for two hundred and sixty eight days, 10½ beer quarts per day.
6. Cow—John Stone, Marblehead, Mass., 1823. From June to October, averaged eleven pounds of butter per week.
7. Cow—Luke Fiske, Waltham, Mass., 1824. Made 12 pounds butter per week.
8. Cow—Geo. H. Hardy, Waltham, Mass., 1826. Average, for four months, eleven pounds and three quarters per week.
9. Cow—Rev. Jno. White, Dedham, Mass., 1826. Gave 12 pounds butter six weeks in succession—one week 12 lbs. 13 oz.—3 months averaged 10½ lbs. per week—gave 18 qts. milk per day at times.
10. Cow—N. Pierce, Salem, Mass., 1826. 3,528 qts. milk per year—nearly 10 qts. per day.
11. Cow—Jas. Robbins, Watertown, Mass., 1827. May and June, from 10 to 13 lbs. butter per week.
12. Cow—Ralph Haskins, Dorchester, Mass., 1827. 18 qts. per day—average 14 to 15 qts. Before grass fed in April, the cream of two days made 2½ lbs. butter, and was made from 2 1-16 qts. of cream. Two or three minutes in churning.
13. Two cows—Rev. John Phenix, Chicopee, Mass., 1828. For several weeks averaged 20 lbs. per week, beside what milk and cream were used in the family.
14. Cow—E. Harris, Moorstown, N. J., 1829. 32 qts. per day—supposed wine qts.—fed, good pasturage.
15. Cow—Jeremiah Stickney, Rowley, Mass., 1829. 19 qts. daily—calf, at six weeks old, 196 lbs. gain 2 3-7 lbs. per day.
16. Cow—W. Chase, Somerset, R. I., 1831. Most of the season 20 qts. of milk daily—averaged nearly 14 lbs. of butter per week during the season—120 lbs. made in ten weeks.
17. Cow—Israel Graves, Northampton, Mass., 1830. Four years old—one week, 13 lbs. 9 oz. butter.
18. Cow—Isaac Osgood, Andover, Mass., 1831. 17 quarts milk per day—50 lbs. butter in the month of June.
19. Cow—L. Hosmer, Bedford, Mass., 1830. 14 lbs. of butter per week.
20. Heifer—2-3 years old—L. Hasseltine, Haverhill, Mass. 14 lbs. of butter one week—18½ lbs. in 10½ days.
21. Cow—Saml. Noah, Danvers, Mass., 1831. In 148 days from 2d May, gave 567½ gallons milk—more than four gallons per day beer measure.
22. Cow—Timothy Flanders, Haverhill, Mass., 1832. From 20th April to 22nd September, besides 46½ gallons milk for family use, made 163 lbs. 4 oz. butter.
23. Four cows—Jesse Putnam, Danvers, Mass., 1830. Averaged more than 200 lbs. butter each in the season—highly fed.

24. Six cows—J. Curtis, Marblehead, Mass., 1830.

Average over 181 lbs. butter each, without extra feed.

25. Cow—S. Sergeant, Stockbridge, Mass., 1831.

From 6th April, 1828, 321 days, 381 lbs. 6 oz.

16th " 1829, 284 " 298 lbs. 1 oz.

5th " 1830, 306 " 318 lbs. 10 oz.

911 days, 943 lbs. 1 oz.

The above is exclusive of 25 lbs. 9 oz. made while fattening 3 calves, and furnishing a family of four persons with milk and cream.

26. Cow—W. Dickinson, Deerfield, Mass., 1830.

One week, 14 lbs.—first eight weeks after calf was taken away, made 96 lbs. Six quarts of milk made one pound of butter.

27. Cow—H. G. Newcomb, Greenfield, Mass., 1830.

From March 27th to May 25th, made 100 pounds of butter, and reserved 160 quarts of milk.

In 14 days, made 29 $\frac{3}{4}$ lbs. of butter.

28. Cow—D. Wait, Greenfield, Mass., 1830.

In one fortnight made 25 lbs. of butter.

In May, 1832, she produced in one week 15 $\frac{1}{2}$ lbs. of butter. Average daily weight of milk, 37 lbs. Measured one day 26 beer quarts.

29. Two cows—Hart, Shelburne, Mass., 1834.

Besides milk and butter used for a family of 3 persons, they sold from these two cows last season upwards of 400 lbs. butter—feed, grass only. In June, she made in one week 23 lbs.—one week 26 lbs.—one week 26 lbs.

30. Cow—Barrett, Northampton, Mass., 1830.

This cow milked, for one fortnight, every eight hours—at each milking has yielded a pailful holding ten quarts—the weight of the milk averaging daily 49 $\frac{1}{2}$ lbs. Her milk has yielded daily 2 lbs. 5 oz. butter—making 32 lbs. 6 oz. in 14 days. From one milking alone 1 lb. 6 oz. were made, which will give 4 lbs. 2 oz. of butter in one day from one cow—the butter was of a superior quality, and brought a high price in this market.—*Northampton Courier*, March 1833.

31. Cow owned in New London, Conn., yielded 10 quarts milk per day for 14 successive months.

For the 30th example I have only the authority quoted, which I have no reason to doubt. Most of the others have been authenticated under oath; and most of the cows and owners I have seen.

I have already, Mr. Editor, extended this communication to an inordinate length. I shall leave it for the present, without farther comment; and only add, in behalf of myself and the whole agricultural public, that the respected and liberal gentlemen, owners of the improved Durham stock will confer a great obligation, and add to their patriotic services, if they will favor the public with as exact and full statements, from their own actual experiments, of the dairy produce of their beautiful and valuable animals.

H. C.

Meadowbanks, Feb. 8th, 1835.

VOL. II—62

THE QUANTITY OF WOOD REQUIRED TO BURN LIME.

To the Editor of the Farmers' Register.

New Kent, March 4th, 1835.

In the 1st Vol. and 1st No. of the Farmers' Register there is an article headed "Memoranda of cultivation and improvement practised by Fielding Lewis, Esq. of Weyanoke," to which my attention has been particularly called, by the information it gives on the subject of liming, and the burning of shells. I have put up several kilns this spring, and the quantity of wood prepared for them was ascertained by reference to the quantity said to have been used by Mr. Lewis. In every case, I found I had more wood than could be placed in the kilns, if I observed the directions of Mr. L. This has caused me to re-examine the statement made in these memoranda relative to the kiln of 100 hds. of shells, and unless I am greatly deceived, there is an important error as to the quantity of wood. The kiln is said to have been "17 feet by 17 feet—and 9 feet high, inside measure, and ten cords (besides three of kindling wood,) were used in burning it." Now sir, will you be so obliging as to tell me whether it is possible to put ten cords of wood and 100 hds. of shells in that space? And whether the 77 inches allowed for the shells would contain 100 hds? It is probable the layers of shells were thicker than Mr. L. supposed. But I think that more than six cords of wood (except for kindling,) could scarcely have been consumed in such a kiln. My object is simply to call your attention to it, that you may correct any material error on this important subject.

J. S.

[Mr. Lewis, though noted for his accuracy, might have made some mistake in the quantities which he stated—and if so, J. S. has had, in actual trials, better means than we could bring, to establish the error. But without such trial, the calculation of the space occupied by the wood and shells separately, will not show what space they would require when placed in alternate layers—and for this reason: In measuring corded wood, the hollow spaces are counted as much as the solid wood: but when disposed in thin layers, most of these hollows would be filled with the shells. The openings between the logs forming the pen (not included in the inside measure of 17 feet) would also take many cubic feet of shells. Besides—the space left below the kiln, of a foot in depth, was filled with the kindling wood—and possibly was added to after the fire commenced.]

REMARKS ON THE DIFFERENT SPECIES OF COTTON.

To the Editor of the Farmers' Register.

I sent you lately some remarks on Mr. Spalding's article on the different species of cotton cultivated in the United States. These were stated to be three in number. 1. The Green Seed Cotton (*Gossypium herbaceum*.) 2. The Mexican Cotton (*G. hirsutum*.) 3. The Sea Island Cotton (*G. barbadense*?) A fourth species may now be added, the nankeen cotton from China, which is now beginning to be cultivated by a few persons

in Georgia. The seed are scarce, and it will probably be some years before it is produced in abundance. Indeed it is probable that the market never will require a great quantity of it.

I feel a curiosity to know what species of cotton it is which is now cultivated in Egypt, and whether it is prepared for market by the saw-gin? I perceive by the Liverpool price currents, that the Egyptian cotton ranks next to our sea islands, and much above our upland cotton. This leads me to suppose that it is not the *G. herbaceum*, (which however has been long cultivated in Syria and the Levant,) and I know not what other species it may be. If any of your correspondents, either in this country, or in Europe, can give information on this point, I should be glad if he would communicate it through the Register. It would also be desirable to procure some of the seed of the Egyptian cotton and have it tried in some of the southern states. Our consul at Marseilles might procure the seed from Alexandria, and ship them to the United States.*

In my remarks on Mr. Spalding's article on cotton, I have given the specific characters of the *Gossypium barbadense*. It may be well to add, as an appendix to my remarks, the characters of all the species then mentioned, as furnished by the Encyclopædia of Plants—as follows:

1. "*Gossypium herbaceum*, [green seed cotton.] Native country, East Indies—leaves 5 lobed, glandular beneath: lobes round mucronate, Invol. serrate, stem smooth."

2. "*G. hirsutum*, [Mexican and Petit Gulf.] South America—upper leaves undivided cordate; lower 3-5 lobed with 1 gland beneath: branches and petioles hirsute."

3. "*G. barbadense* [sea island cotton?] Barbadoes—upper leaves 3 lobed; lower 5 lobed with 3 glands beneath; stem smoothish."

4. "*G. arboreum*, [tree cotton.] East Indies—leaves 5 lobed palmate; upper 3 lobed with 1 gland beneath, Inv. tern. Cal. with 3 glands at base."

H. B. CROOM.

EGYPTIAN COTTON.

To the Editor of the Farmers' Register.

In my remarks on Mr. Spalding's essay on cotton, I said—"It may be doubted whether Mr. S. is correct in supposing that the wool of the Sea Island cotton becomes less fine when carried south of the St. Mary's."

This doubt I must now retract, subsequent inquiry having satisfied me that the cotton of the West Indies is not so fine as that of the Sea Islands of Georgia and South Carolina, though produced, as I suppose, from the same plant.

In an article in a late periodical, purporting to be an abstract of a lecture on the natural history of the cotton plant, delivered in London by a Mr. Aikin, it is stated that the wool of the Egyptian cotton is long, fine, and silky, and that it has lately "been improved by the introduction of the seeds of the Sea Island cotton." How is this to be understood? That the Sea Island cotton has superseded that which was before cultivated?—or

* We have made an attempt to gratify our correspondent's wish to obtain cotton seed from Egypt, which we hope will be successful.—Ed.

does the lecturer mean that it has been crossed on the other? But hybrid plants as well as hybrid animals are, I believe, generally barren.

A difference, however, should be noted between *varieties* of the same species, and *hybrids*, which result from the mingling of different species.

H. B. CROOM.

March, 1835.

HONEY LOCUST AND MOUNTAIN LOCUST.

To the Editor of the Farmers' Register.

* * * The Honey Locust (*Gleditsia*) is native in the alluvial portions of Virginia and the Carolinas. The White or Mountain Locust (*Robinia pseudacacia*) I think, is not. Its native position is on the Alleghany Mountains; but it has been so much disseminated by transplantation, as probably to lead you into an error in this respect. If I am wrong, the error is common to all the writers on the botany of North America. I have seen it in great profusion on the ridges of the Alleghany Mountains; but I do not remember to have seen it any where native in the low or level country.

H. B. C.

[With the great deference which is due from us, confessedly ignorant of botany as we are, to the opinions of one who possesses much knowledge on that subject, we must still doubt the correctness of the information which our correspondent has received as to both these trees. The honey locust is so rarely seen in lower Virginia, except near dwellings, that it has therefore been supposed to be a foreign tree. But if this opinion is incorrect, we can scarcely be mistaken in supposing the other locust, which is called by the various and contradictory names of white, yellow, or black locust, to be a native tree. In this neighborhood, the general and long established name is "wild locust"—which of itself is some evidence of its being indigenous. But the mistake of botanists (if in this matter they are mistaken) is probably caused by this tree being almost never seen growing naturally on any soils except a class that are very scarce in lower Virginia—that is, such as contain, a notable proportion of calcareous earth, or lime in some form. In this county, it would be impossible to find a locust growing naturally, a mile from James River, and perhaps, for many miles southward. But on steep river banks, and in deep ravines, where the beds of shell marl, or other calcareous matters have affected the soil, this tree is one of the most vigorous, and rapid in growth, and so general and abundant in the places least touched by the labors of man, that it is scarcely possible that it could have been introduced from a distant region.

The locust is not the only tree so strictly limited to our few soils containing lime, as to be scarcely known to many residents of our country. A respectable farmer who had moved from Surry county to Kentucky, described to us the papaw, as a growth peculiar to that region, and which he had never heard of in Virginia. Yet he had lived 40 years within 20 miles of James River, where, on the rich calcareous hill-sides, the papaw grows and bears its fruit well, and exhibits

the peculiar characters which so strongly attracted this gentleman's notice afterwards in Kentucky.]

PROGRESS OF THE MANUFACTURE OF OIL FROM RAPE IN FRANCE.*

Extract from a Report of a committee to the Agricultural Society of Caen.

Translated for the Farmers' Register from the *Annales de l'Agriculture Française* of Dec. 1834.

The manufacture of oil from rape seed has rendered such great services to the agriculture of the department, that it deserves to have a distinguished place in the annals of the industry of Calvados. Oil mills have multiplied; the culture of rape is extended; and the cultivators find a ready market for this commodity, which is a valuable resource for them; especially in years when corn is low, and the sale of horses is unprofitable. Honor then to him who has endowed our country with this branch of industry! Honor to the family of Le Cavalier, which first set it on foot and sustained it! They have deserved much from agriculture. About 22,000 hectolitres of rape seed are made in the department, which we may suppose to be the product of 11,600 hectares of all qualities of land fit to be put under this culture. The oil cake which cultivators purchase of the manufacturers of oil, procures for them the addition of manure which the culture of rape makes necessary. The stalks and stems of this plant serve for fuel in the plain, where wood is scarce and dear; or, they may be converted into manure. In this way all the products of the rape may be turned to the profit of agriculture. Forty oil mills are at work in the department, which furnish every year more than 56,000 casks (barriques) of oil, containing 100 kilogrammes each. Of this number, 37 are worked by water, and 3 by steam. The former are situated on many of the rivers which water the department. The waters of many of them are reduced by drought considerably towards the end of summer. The work of the mills diminishes in proportion, and sometimes even ceases for a while. The three moved by steam, are situated at Caen, or at a little distance from the town. The oldest is that of M. Foucamberge, who established it near the suburbs of Maladerie. He designed it at first to grind corn; but being unable to overcome the usages and prejudices of the country, he abandoned this kind of industry and substituted the manufacture of oil. This good example was followed by M. Larue-Elie, who obtained a steam engine from the cotton mills of the Ursulines, and established an oil manufactory at Mondeville, to which he has joined a manufacture of animal black. The third mill is the one which M. Tillard has recently established in the middle of the town, near the port. This estimable manufacturer has neglected nothing to make it as perfect as possible. More than half of the oil is purified before its exportation. There are six establishments there, in which purifying alone is carried on. All are situated in the town of Caen. Some manufacturers only purify their own oil. Five manufacturers and three refiners have exposed samples of their produce—the former are M. M. Danjou, Tillard, Pierre, Le Cavalier, Marc

Elie and Levard; the latter are M. M. Eudes, Nicolas le Cavalier and Frederic le Cavalier. The oil of the manufactures of Calvados has, in commerce, a merited preference; but it would have been impossible for your committee to make a distinction in the quality of the oils of each of these manufacturers: it is then on other grounds that you ought to place your judgement. M. Levard has introduced the manufacture of oil in the arrondissement of Vire. M. Marc Elie has used in his manufacture (situated at Laize-la-Ville) mill stones of granite to crush the seed. M. Pierre le Cavalier also uses these mill stones, and sustains the well merited reputation which his family has enjoyed for so long a time; they obtained a medal at the exhibition of 1806. M. Tillard established in the town a magnificent oil manufacture, remarkable for its steam engine of 16 horse-power, which serves to break and bruise the grain with heavy vertical mill stones of granite, to stir the seed in the stoves, and to squeeze out the oil by hydraulic presses. M. Danjou has many establishments: he manufactures a large quantity of oil, and purifies a part of it. M. Eudes purifies more oil than any one of them.

EXTRACTS FROM A REPORT ON THE AGRICULTURE OF EAST AND WEST FLANDERS.

By the Rev. THOMAS RADCLIFF.

Cultivation of Flax, and application of Liquid Manure.

In addition to those crops in some part of the district,* particularly in the line between Woomen and Ypres, magnificent crops of rape are cultivated, and are relied on as a sure and profitable return.

Flax is also a crop upon which their best industry is bestowed, and their careful preparation of the soil is scarcely to be surpassed by that of the neatest garden. This preparation, is as follows: the field intended for the flax, after two or three ploughings and harrowings, is backed up in the centre, and ploughed round in but one set, so as to leave it without any furrow. The heavy roller is drawn across the ploughing by three horses, the liquid manure is then spread equally over the entire surface, and when well harrowed in by eight or nine strokes of the harrow, the seed is sown, which is also harrowed in by a light harrow with wooden pins of less than three inches, and the surface, to conclude the operation, is again carefully rolled. Nothing can exceed the smoothness and cultivated appearance of fields thus accurately prepared. The manure universally used for this crop demands particular notice—it is termed liquid manure, and consists of the urine of cattle, in which rape-cake has been dissolved, and in which the *vidanges* conveyed from privies of the adjoining towns and villages, have also been blended. This manure is gradually collected in subterraneous vaults of brickwork at the verge of the farm next to the main road. Those receptacles are generally forty feet long by fourteen wide, and seven or eight feet deep, and in some cases are contrived with the crown of the arch so much below the surface of the ground, as to admit the plough to work over it. An aperture is left in the

* See an account of rape oil, and the value of the rape crop at page 646 Vol. I. Farm. Reg.

* The South Western part of Belgium, adjoining French Flanders.

side, through which the manure is received from the cart by means of a shoot or trough, and at one end an opening is left to bring it up again, by means of a temporary pump, which delivers it either into carts or tonneaus.*

In this manner it is carried to the field, and one or other mode adopted, according to the distance. Where the *cart* plies, the manure is carried in a great sheet called a *voile*, closed at the corners by running strings, and secured to the four uprights of the cart: two men, standing one on each side of the cart, scatter it with hollow shovels upon the rolled ground—or where the tonneaus are made use of, each is carried by two men with poles, and set down at equal intervals across the field in the line of the rolling. There are two sets of vessels, which enable the men, who deposite the loaded ones, to bring back the others empty. One man to each vessel, with a scoop, or rather a kind of bowl with a long handle, spreads the manure, so as to cover a certain space; and thus, by preserving the intervals correctly, they can precisely gauge the quantity for a given extent of surface. For the flax crop they are profuse, and of this liquid mixture in this part of the country they usually allow 400 hectolitres (in which 3000 rape-cakes have been dissolved,) to the bonnier, which is at the rate of 2480 gallons beer measure to the English acre. As a similarity of practice prevails in that part of No. III. which resembles this in soil, we shall proceed to that district.

DIVISION NO. III.

Boundaries, Soil, general Produce, and Rotations.

This division is bounded on the north by Wimples, St. Eloy and Hulste; on the east by the river Lys to Courtray; on the south by French Flanders, and on the west by a line to the east of Rousse-laer and Zandvoorde. Its chief places are Courtray, Menin, Wervike, and Dadizeele.

The soil of the southern part of this division is very nearly of the same quality as that of the former; but the remaining part is more sandy. It is a division, however, in great repute, as to its cultivation: its chief produce, wheat, flax, rye, potatoes, oats, and rape-seed. Its secondary produce, buck-wheat, turnips, clover. Its natural meadows, on the banks of the river, yield a fine quality of hay. The country is here more open; the farms larger, the plantations fewer; sufficient, however, for ornament and utility.

On the eastern side of this division is the farm of Vollandre, belonging to a man of the name of Bogaert, of about 200 English acres in extent, which being on a great scale for Flanders, is worthy of notice, and especially as marking the general practice of that quarter. This beautiful area of cultivation is laid out as to its crops, in parallel lines, perpendicular to a road without fence, which pervades the entire, and commands both sides for all farming purposes. The contour is that of a rich garden, the effect of industry and manure; for the soil is such as, in our countries, we should hold in disesteem, viz. a light-grey loam strongly impregnated with sand; yet the following crops are produced from it in the best perfection:

1. Rape, with urine and rape-cake,

2. Wheat or rye, with dung,
3. Rye and clover, without manure,
4. Clover, with ashes,
5. Wheat, with urine,
6. Turnips, with dung and urine,
7. Oats, without manure,
8. Flax with abundant manure;

viz. bruised rape-cake 5000 cakes to the bonnier, about 1 ton 6½ cwt. to the English acre, or of liquid manure, (denominated *court graisse*,) 400 hectolitres to the bonnier (as in No. III.,) about 2480 gallons to the English acre.

Culture and advantages of Rape.

Rape-seed is an object of such agricultural moment in Flanders, and so well adapted to the generality of the soil of Ireland, (particularly to those parts which are as yet unreclaimed, but which, through the medium of this valuable seed, might be converted with profit, into a state of cultivation and fertility,) that it was satisfactory to learn, and from so good a practical authority as this farmer, the precise value of his crop at the time of our conversation. His produce was 40 sacks, or 50 hectolitres per bonnier, which is 14½ hectolitres, or about five quarters to the English acre. His crop sold by the sack for 39 francs, which would be about the rate of £18 10s. per English acre at par.

Exclusive of the manure, viz. 2000 rape-cakes and sixty-four carts of liquid manure to the bonnier, which is estimated at £19 being about £5 10s. by the English acre, the remaining cost is that of two ploughings and about 80 men employed in manuring, transplanting, weeding, earthing, pulling, and thrashing, the crop; which by the English acre, may altogether be estimated at about £1 12s. The plants are valued at 10s., so the account would stand thus:

	£.	s.	d.
Gross amount of rape-seed, per English acre,	-	-	18 10 0
Manure, in value,	-	5	10 0
Ploughing, and labor,	-	1	12 0
Rape plants,	-	0	10 0
	£7	12	0
			7 12 0
Profit* per English acre,	-	£10	18 0

* It is well that the culture of this plant is beginning to extend itself in Ireland, and that ample encouragement is exhibited upon the farm of Mr. Samuel Garnett, near Kells, in the county of Meath, reclaimed by his skill and industry from an absolute marsh, and without any manure except the surface ashes, producing the most luxuriant crops. His first essay, of about eight acres, yielded 17 barrels per acre, and sold at 41s. per barrel, making £34 17s. per Irish acre. In the last autumn he prepared 38 acres of transplanted rape, which promised still better than that of the former year, but was not so productive, and he has now upon the same farm 45 acres for the ensuing crop, sown broadcast, and 3 feet in height in most parts of it, in the month of November.

This reclaimed marsh had been from time immemorial inundated, except from the summer months, when it was merely applicable to horses and young cattle. By taking the proper levels, and sinking the river at a

* The tonneau resembles a beer barrel, and contains 176 litres, about 38 gallons English.

It is agreeable, in an agricultural inquiry, to bring any thing to a specific point, and this is the result of the practice upon a well-managed farm, in 1817, where manure is always dear, from the great demand, and at a time that rape-seed happened to be low—nevertheless, a very fair return appears, even after the payment of rent and taxes; the rent of this farm being at the rate of 24s., and the taxes at that of 6s. 8d. by the English acre; which leaves a net profit upon each of £9 7s. 4d. But the Flemish farmer is not always satisfied with the profit on the seed. Oil-mills abound in such numbers throughout this country, that he is generally the manufacturer of what is necessary for his home consumption, and not unfrequently for sale. The expenses of the oil-mill in its construction and management, the proprietors make a mystery of; but the profit must be very considerable, as is well known by the farmers who manufacture for themselves. Some establishments of this nature, formed in the reclaimable bogs and mountains of Ireland, would shortly spread the cultivation of this profitable seed, which in many places can be grown without manure, but generally on the burnt surface of the ground to be reclaimed; and by its own refuse, (of cakes from which the oil has been expressed,) capable of renewing the soil which has produced it, and of preparing it for other crops. In mountainous tracts, where limestone is not to be found, but where frequent mill-sites occur, it might prove an admirable succedaneum as a manure, and act as a profitable improvement in every branch of its process.

It is but seldom managed in our countries as in Flanders, but is sometimes there sown, as with us, broad-cast. The general and approved method is however, by transplanting, which they alledge, and apparently with great justice, to have many advantages: one, that the seed-bed occupies but a small space, whilst the land which is to carry the general crop is bearing corn. By having the plants growing, they have time to harvest their corn, to plough and manure the stubble intended for the rape, which they put in with the dibble, or the plough, from the latter end of September to the second week of November, without apprehending any miscarriage.

The seed-bed is sown in August, and even to the middle of September. In October, or sooner, the stubble is ploughed over, manured, and ploughed again. The plants are dibbled in the seams of the ploughing, (each furrow-lice being twelve inches broad,) and are set out at twelve inches distance in the rows. Instead of dibbling upon the second ploughing, in many cases they lay the plants at the proper distances across the furrow, and as the plough goes forward, the roots are covered, and a woman follows to set them a little up, and to give them firmness in the ground, where necessary. Immediately after the frost, and again in the month of April, the intervals are weeded and hand-hoed, and the earth drawn up to the plants, which is the last operation till the harvest. It is pulled rather green, but ripens in the stack; it is thrashed without any particular management; but the application of the haulm or straw, is a

matter of new and profitable discovery: it is burned for ashes, as manure, which are found to be so highly valuable beyond all other sorts which have been tried, that they bear a price as three to one above the other kinds, and it is considered, that upon clover, a dressing of one-third less of these is amply sufficient.

The Urine Cistern.

The rape crop has been dwelt upon as one suited to our countries, and extremely prized in Flanders; but how much more valuable to us, whose soil demands not such abundant and expensive manure. The urine cistern, (from which, in this district, the rape crop is manured,) is constructed to contain any given quantity, and is contracted for by the bricklayers (finding materials) at one franc (or 20 sols of France) per tonneau, of 38 gallons English. The usual capacity of the vault, as adopted on the farm of Vollandre, is for 1000 tonneaux, (cost about £45 British,) which quantity for the rape crop will manure little more than two bonniers, or about seven English acres. But the cistern under the stables is nearly of double size: from this the exterior cistern is filled, and between both, the farmer can fairly count upon manuring in the best manner six bonniers, or twenty-one English acres; or perhaps two bonniers in addition, of crops which do not require so much manure. The whole of this quantity (exclusive of farm-yard dung, ashes, composts, &c.) is produced by eight horses, and thirty-six head of cattle, housed winter and summer in well constructed stables, increased by the adventitious aid of the rape cake, and the *vidanges* from the privies. In a cistern of 1000 tonneaux, it is not unusual to dissolve from 2000 to 4000 rape cakes of two pounds each; indeed neither industry nor expense is spared for the collection of manure, as upon that depend the produce and fertility of a naturally bad soil. The farmer who fails to make those exertions, is sure to be left in the back ground.

In the immediate vicinity of this well cultivated farm, one of a very different aspect presents itself: upon inquiring the cause, you are told of the proprietor, "*Il n'aime pas les bons-bons*"—the exulting term for their favorite manure.

The cistern is for the most part formed under the range of stables, from each stall of which the urine is conducted to a common grating, through which it descends into the vault; from thence it is taken up by a pump: in the best regulated, there is a partition in the cistern, with a valve to admit the contents of the first space into the second, to be preserved there free from the later acquisition, age adding considerably to its efficacy.

This species of manure is relied on beyond any other, upon all the light soils throughout Flanders, and even upon the strong lands (originally so rich as to preclude the necessity of manure,) is now coming into great esteem, being considered applicable to most crops, and to all the varieties of soil.

May we not then press it upon the notice of farmers of the British empire? In England and Scotland it is little known; in Ireland not at all. Where farm-offices are to be erected, the additional cost of forming them upon vaults, and regulating the flagging or pavement, so as to supply

considerable cost, Mr. Garnett has set a spirited example of industry, and now begins to reap the advantage of his enterprise.

those vaults, would be soon repaid by the advantage of the best kind of manure, which at present is universally suffered to flow away in waste. Even to offices already built, an exterior cistern might be added; but it is essential that it should be secure from the admission of rain, or any other water.

The collection made in the winter months would be a great source of fertility; but if once connected with a regular soiling system, the increase would embrace an infinitely wide extent.

By an extensive cultivation of rape, and by the general establishment of these cisterns; to what pitch of improvement and produce might not the light lands of Great Britain and Ireland be speedily advanced? If it be a practical fact, that upon the farm of Vollandre, the urine of 44 head of cattle, with the aid of 12000 rape cakes of two pounds each, is sufficient to manure in the best manner twenty-one English acres, the proprietor of a rape mill, who could house double that number of cattle, might venture on the improvement of an extensive tract, with every prospect of success. But the addition of the rape cake is only for those who have the material in possession, or are able to purchase it; even without it, the liquid manure is highly efficacious, but will not spread so far, or be so permanent; the cost, however, is only that of providing a suitable cistern; and if the mention now made of this practice, shall hereafter appear to have been the means of introducing it into our countries, it may have eventually rendered the cause of agriculture no inconsiderable service.

REPORT ON THE MULBERRY OF THE PHILIPPINES, (*Morus cucullata*.)

Made to the Academy of Dijon, by one of its members, Mr. TILLOV, of the Medical Jury of the department of Côté d'Or, (August 1834.)

Translated for the Farmers' Register, from the *Annales de l'Agriculture Française*.

In 1831, I had the honor of making a report to the Academy on a memoir which had been addressed to it by M. Bonafous. The culture of mulberries on meadows, and the introduction of a new species of mulberry, were the subject of this memoir. At that time I only gave an account of the work, not having the means to repeat the experiments which were relative to it. Since, the Academy has owed to the extreme kindness of M. Bonafous the sending of a score of mulberry trees from the Philippines. These are they which have assisted my attempts to make plain the advantages which they present over the other species of mulberry.

As the author of the memoir had mentioned, the shoots of this mulberry increase from six to seven feet in one year, the leaves are rapidly developed, many of them being from ten to twelve inches in length, and from eight to ten in breadth. Besides, it has the great advantage of being in-

creased by slips, and from the large size of its leaves we will admit with M. Bonafous, that five thousand slips of this mulberry would be equal to one hundred thousand plants of the common white mulberry. Since these mulberry trees have been planted, there has not been weather sufficiently cold to assure us that they could stand it: but the experiments of M. Bonafous leave no doubt in this respect. The good quality of the leaves cannot be disputed, after the confidence which one ought to grant to the author, and after the experiments we have made, an account of which we are going to give you.

In the same situation, and in the same temperature, five hundred silk worms have been raised on the common white mulberry, and five hundred on the mulberry of the Philippines. The time of the raising was of the same duration; 15 pounds of the leaves of the white mulberry, and 15 pounds of the mulberry of the Philippines were sufficient for both. The labor of the silk worms being over, the cocoons were weighed: 384 cocoons of the worms fed on the mulberry of the Philippines weighed one pound, while it took 420 of the others for the same weight: both gave two ounces of very fine silk from a pound of cocoons. The only difference that has been remarked, was, that in winding the cocoons furnished by the worms fed on the mulberry of the Philippine, no threads were broken, which was not the case with the others. This is a proof of the superior quality of the silk of the first.

It is then clearly proved that this mulberry has a real advantage over the other species. They give a larger quantity of leaves, cocoons heavier, and richer in silk of the best quality.

If M. Perrotet has rendered a great service to this branch of industry by the introduction of this species of mulberry, M. Bonafous has made that service effectual by his care to multiply the plant, to spread it, and to make all its advantages known.

PROPAGATION OF THE CHINESE MULBERRY.

Translated for the Farmers' Register from the *Sommaire des séances*, &c. of January 7, 1835.

M. Valmorin reads an extract of a letter from M. Maupoil, a Frenchman settled at Dolo, in Lombardy, relating to the rearing of silk worms in 1834, by means of the mulberry of the Philippines. It appears from this letter, that in 1834 the rearing of silk worms on these leaves has succeeded as well as in 1833, or as well as it was possible to desire. It also is there stated, that M. Maupoil, who propagates the mulberry of the Philippines in every mode, has observed that the plants raised from seeds, tended to approach [in character] the common white mulberry; whence he is led to conclude, it may not be but a variety of this mulberry, and that to preserve the former, with the qualities which recommend it, it must be propagated by slips, and by grafting.*

*The plant described above, under a different name, (both common and botanical) is that known in this country as the Chinese Mulberry, (*morus multicaulis*.) —Ed. Farm. Reg.

*This additional testimony of the unfitness of the seeds of the Chinese Mulberry to continue its kind has reached us (in the *Annales*, &c. for January 1835) since the note on this subject at page 736, was printed. —Ed. Farm. Reg.

QUERIES ON ORCHARD GRASS.

To the Editor of the Farmers' Register.]

Intending this spring to sow some of the orchard grass for the purpose of making hay, can I get the favor of you as soon as convenient, to forward me your views—1. Of the time when the seed should be sown. 2. The quantity to the acre. 3. The manner of preparing the land for its reception. 4. The proper time for cutting when used as hay—and lastly, whether or not the article will grow advantageously on high land.

R. P. R.

[Before the foregoing queries could be answered properly, the season for which they were designed had passed. It is hoped that before the next seed time, some reader who is practically acquainted with orchard grass will give the information desired, together with such other statements on the subject as may be useful to those commencing the culture.]

THE VALUE OF LIME AS MEDICINE FOR HORSES.

To the Editor of the Farmers' Register.

Williamsburg, Va., March 27, 1835.

Believing that any communication which has for its object the health of that useful animal, the horse, will be acceptable to very many of your readers, I have thought proper to forward the following remarks, which, if it suits your pleasure, may be inserted in the next number of your valuable journal.

It is probable that more horses are lost from the effects of the grub worm, than from any other assignable cause. Knowing so well therefore, the imminent danger from an attack of grubs properly speaking, it is a matter of the first moment, if possible, by some means to prevent their generation. With this object in view, I have for several years been in the habit of giving my horses a portion of slaked lime in their food. Its effects are—1. To correct any excess of acid in the alimentary canal, and otherwise preserve the healthy condition of the digestive organs. 2. It keeps up a healthy action on the skin, as is evidenced by the sleek coat of hair which the horse will have whilst under its use. 3. It will cause the grubs to be evacuated, either entire or mutilated. My plan is, during the spring and fall months (suspending its use occasionally for two weeks) to give a dessert spoonful twice a day in some kind of chopped food, with meal or bran. It is necessary in order to remove the coarser parts of the lime that it should be passed through a fine sieve. For this remedy, I am indebted to the late Maj. John Pryor, of the city of Richmond, who was proverbial for his knowledge in veterinary science. It appears that in travelling to the mountains during a season of excessive drought, of a great number of wagons on the road, he found the horses of but one to look well. They presenting so fine and healthy an appearance, and their general condition being so widely different from all others met with during his travel, his curiosity prompted him to inquire of the driver of the team alluded to, how it was that his horses were so fat. He replied, that he gave them lime. After a long experience, he became entirely satisfied of the effica-

cy of the article, and I can confidently recommend it as an invaluable remedial agent in not only preventing, but also in the expulsion of every kind of worm from the intestinal canal of the horse.

ROBERT P. RICHARDSON.

For the Farmers' Register.

QUERIES ON SALT MARSHES AND MEADOWS.

Will herds grass grow upon land which has been occasionally overflowed by the salt water of the bay, and in consequence thereof has become well saturated with salt? Would it prove destructive to the grass, if the tide should overflow it once or twice in the course of its growth?

It would be conferring a favor on a brother farmer, and perhaps on many, if any gentleman, who possesses the information, would answer the above questions, and give any other information on the subject of meadows exposed to inundations of the salt tide water.

A FARMER.

Mathews county.

From Insect Transformations.

EARTH WORMS.

The common earth worm (*Lumbricus terrestris*) is instinctively afraid of moles; and no sooner does it hear any subterranean noise, or feel any shaking of the ground, similar to those indicative of the approaching movements of its enemy, than it makes a speedy escape to the surface. Every boy knows how to take advantage of this to procure fish baits, by thrusting a spade or a stake into the ground, and moving it backwards and forwards, to imitate the advance of a mole burrowing in search of prey. The worm, unable from its instinct to discriminate between its subterranean enemy and the spade, darts into daylight, and is instantly captured for the boy's bait-bag. The lapwing (*Vanellus cristatus*, MEYER,) it is stated by Dr. Anderson in his 'Bee,' is aware of this instinctive fear in the earth worm of subterranean concussions or noises; and when it cannot find sufficiency of slugs,* &c. above ground, it pats with its feet, till the earth worms, mistaking it for an advancing mole, come forth to be feasted upon.

IMPROVEMENTS MADE BY SMALL AND POOR FARMERS.

The extracts from the British Farmer's Magazine in this No. (page 724) were copied from another print, our January number of that work not having then arrived. Since its reception, we find that the most interesting facts connected with the statements there given, were omitted, and which we will now supply. The meeting was at a public dinner given by the Earl of Gosford, to his deserving tenants, with many other invited guests, and the object was to distribute prizes for, and to celebrate the valuable labors and improvements of the preceding year. It was these labors that were stimulated and brought to such important ends, by the instruction and encouragement of Mr. Blacker,

* "Nourriture;—insectes, araignées, vers, et petits limaçons." TEMMINCK, Manuel d'Ornithologie, p. 552, 2d edit.

of whose operations some account was given in our last number: and the fruits, presented in the products of these small farmers, certainly place Mr. Blacker's services in a much higher position than would have appeared from the previous account alone, highly as we then thought and spoke of them.

THE SEASON THROUGH APRIL.

The spring to this time, (April 28th,) has been as remarkably cold, for the time of year, as the winter had been below the temperature of our usual cold season. The corn planting has been made very late, by wet, as well as by cold weather: and those farmers who, on warm and dry soils, had been enabled to plant earlier, have had the leaves of all the young plants which had come up, cut down by severe frost. There will be very little if any early fruit. The wheat crops generally through the country show almost unprecedented injury from the severe cold of winter. On the rich low grounds of the upper James River, usually sown entirely in May wheat, the destruction is greater than is known elsewhere. From a private letter (of March 31) from the owner of a body of this very fertile and valuable kind of land, in Goochland, we take the following statement. "Our May wheat, on the stiffest James River low grounds above the falls, is so entirely destroyed by the severity of the winter, that some have already decided to sow the land in oats—and all are hesitating whether it is not advisable, and only waiting the latest hour that it will answer to sow oats, to decide—to see what change may possibly take place in that time. At present, the prospect appears utterly hopeless. Other wheats are much injured—but this is the worst."

In our own neighborhood, the wheat on marled land, having been in a measure protected by the peculiar warming power of that manure, shows a superiority to wheat on other lands, much greater than in proportion to the mere difference of fertility—and it may be anticipated that the benefit of marl on wheat this year, will be double as much as is generally seen after favorable winters.

TERMS OF PUBLICATION FOR FARMERS' REGISTER.

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For the Farmers' Register.

MONTHLY COMMERCIAL REPORT.

The business of the present month has been at advanced prices on every article of domestic produce—and foreign commodities generally have also brought higher rates.

Tobacco is sold at prices beyond what have been current for several years past. General sales \$5 50 to \$11—extreme prices \$5 to \$14. Supplies begin to arrive freely, but of the extent of the crop no correct estimate can yet be made.

Cotton has also advanced to unusual rates. It is now $1\frac{1}{2}$ cents per pound higher than last month: sales to some extent having been made in Petersburg at 17 to 18 cents. Supplies which were kept back by the inclemency of the winter begin to appear, but only in moderate quantities, and nearly the whole that remains in the country will probably be at market during the ensuing month. It will require a considerable advance in foreign markets to pay the prices given here for both cotton and tobacco. Whether there is any good grounds for expecting such an advance, it is difficult to say. The increased consumption of cotton is doubtless calculated on—but this does not apply to tobacco.

A small improvement has taken place in the price of flour, which may be ascribed to the apprehension of a short crop of wheat. It is said that the fields in Virginia never presented a more barren aspect—the effect of the severest winter of the present century.

Money continues to be plentiful, particularly in the large cities, which have generally received an accession of banking capital. The rate of exchange on England has been from $8\frac{1}{4}$ to 9 per cent. premium, and some shipments of specie were consequently made. Stocks of all kinds keep up; and among those which are getting into favor, it is pleasing to enumerate those of the rail road companies both at Richmond and Petersburg. A new work of this description is about to be undertaken by the enterprising citizens of the latter place—to wit, a branch from their present rail road, to Wilkins' Ferry on the Roanoke River, at a point above the principal obstructions to the navigation, and but little affected by freshets or low water—possessing also the advantage of a landing immediately at the road, and avoiding some of the expenses at present incurred. This new rail road will offer a great facility to the growers of tobacco and wheat on the Roanoke, as well as to a portion of the cotton country. The work will be commenced forthwith. The operations on the Richmond and Potomac road are continued with great spirit—those on the great James River and Kanawha work are about to be commenced.

X.

April 27, 1835.

AN

ESSAY

ON

CALCAREOUS MANURES.

By Edmund Ruffin.

SECOND EDITION.

SHELLBANKS, VA.

PUBLISHED AT THE OFFICE OF THE FARMERS' REGISTER.

1895.

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SHELLBANKS, Va.—Robert Ricketts, Printer.

P R E F A C E .

THE object of this Essay is to investigate the peculiar features and qualities of the soils of our tide-water district, to show the causes of their general unproductiveness, and to point out means as yet but little used, for their effectual and profitable improvement. My observations are particularly addressed to the cultivators of that part of Virginia which lies between the sea coast and the falls of the rivers, and are generally intended to be applied only within those limits. By thus confining the application of the opinions which will be maintained, it is not intended to deny the propriety of their being further extended. On the contrary, I do not doubt but that they may correctly apply to all similar soils, under similar circumstances; for the operations of nature are conducted by uniform laws, and like causes must every where produce like effects. But as I shall rely for proofs on such facts as are either sufficiently well known already, or may easily be tested by any inquirer, I do not choose to extend my ground so far, as to be opposed by the assertion of other facts, the truth of which can neither be established nor overthrown by any available or sufficient testimony.

The peculiar qualities of our soils have been little noticed, and the causes of those peculiarities have never been sought—and though new and valuable truths may await the first explorers of this opening for agricultural research, yet they can scarcely avoid mistakes sufficiently numerous to moderate the triumph of success. I am not blind to the difficulties of the investigation, nor to my own unfitness to overcome them—nor should I have hazarded the attempt, but for the belief that such an investigation is all important for the improvement of our soil and agriculture, and that it was in vain to hope that it would be undertaken by those who were better qualified to do justice to the subject. I ask a deliberate hearing, and a strict scrutiny of my opinions, from those most interested in their truth. If a change, in most of our lands, from hopeless sterility to a high state of productiveness, is a vain fancy, it will be easy to discover and expose the fallacy of my views: but if these views are well founded, none better deserve the attention of farmers, and nothing can more seriously affect the future agricultural prosperity of our country. No where ought such improvements to be more highly valued, or more eagerly sought, than among us, where so many causes have concurred to reduce our products, and the prices of our lands, to the lowest state, and are yearly extending want, and its consequence, ignorance, among the cultivators and proprietors.

In pursuing this inquiry, it will be necessary to show the truth of various facts and opinions, which as yet are unsupported by authority, and most of which have scarcely been noticed by agricultural writers, unless to be denied. The number of proofs that will be required, and the discursive course through which they must be reached, may probably render more obscure the reasoning of an unpractised writer. Treatises on agriculture ought to be so written as to be clearly understood, though it should be at the expense of some other requisites of good writing—and in this respect, I shall be satisfied if I succeed in making my opinions intelligible to every reader, though many might well dispense with such particular explanations. Agricultural works are seldom considered as requiring very close attention; and therefore, to be made useful, they should be put in a shape suited to cursory and irregular reading. A truth may be clearly established—but if its important consequences cannot be regularly deduced for many pages afterwards, the premises will then probably have been forgotten, so that a very particular reference to them may be required. These considerations must serve as my apology for some repetitions—and for minute explanations and details, which some readers may deem unnecessary.

The theoretical opinions supported in this essay, together with my earliest experiments with calcareous manures, were published in the *American Farmer*, (vol. 3. page 313,) in 1821. No reason has since induced me to retract any of the important positions then assumed. But the many imperfections in that publication, which grew out of my want of experience, made it my duty, at some future time, to correct its errors, and supply the deficiencies of proof, from the fruits of subsequent practice and observation. With these views, this essay was commenced and finished in 1826. But the work had so grown on my hands, that instead of being of a size suitable for insertion in an agricultural journal, it would have filled a volume. The unwillingness to assume so conspicuous a position, as the publication in that form would have required, and the fear that my work would be more likely to meet with neglect or censure than applause, induced me to lay it aside, and to give up all intention of publication. Since that time, the use of fossil shells as a manure has greatly increased, in my own neighborhood and elsewhere, and has been attended generally with all the improvement and profit that was expected. But from paying no regard to the theory of the operation of this manure, and from not taking warning from the known errors and losses of myself as well as others, most persons have used it injudiciously, and have damaged more or less of their lands. So many disasters of this kind, seemed likely to restrain the use of this valuable manure, and even to destroy its reputation, just as it was beginning rapidly to extend. The additional consideration has at last induced me to risk the publication of this essay.

The experience of five more years, since it was written, has not contradicted any of the opinions then advanced—and no change has been made in the work, except in form, and by continuing the reports of experiments to the present time.

It should be remembered, that my attempt to convey instruction is confined to a single means of improving our lands, and increasing our profits: and though many other operations are, from necessity, incidentally noticed, my opinions or practices on such objects are not referred to as furnishing rules for good husbandry. In using calcareous manure for the improvement of poor soils, my labors have been highly successful—but that success is not necessarily accompanied by general good management and economy. To those who know me intimately, it would be unnecessary to confess the small pretensions that I have to the character of a good farmer—but to others, it may be required, for the purpose of explaining why other improvements and practices of good husbandry have not been more aided by, and kept pace with, the effects of my use of calcareous manures.

E. R.

Shellbanks, Virginia, January }
20th, 1832.

ADVERTISEMENT

To Second Edition.

When the first edition of this Essay was published, it met with a reception far more favorable, and a demand from purchasers much greater, than the author's anticipations had reached: and it is merely in accordance with the concurrent testimony of the many agriculturists who have since expressed and published opinions on the subject, to say that the publication has already had great and valuable effects in directing attention, and inducing successful efforts, to the improvement of land by calcareous manures. Experimental knowledge on this head has probably been more than doubled within the last two years; and the narrow limits of the region within which marling had previously been confined, have been enlarged to perhaps tenfold their former extent. Still, the circumstances now existing, however changed for the better, present a mere beginning of the immense and valuable improvements of soil, and increase of profits, that must hereafter grow out of the use of calcareous manures, *if their operation is properly understood by those who apply them.* But if used without that knowledge, their great value will certainly not be found; and indeed, they will often cause more loss than profit. It is therefore not so important to the farmers of our country at large to be convinced of the general and great value of calcareous manures—and to those in the great Atlantic tide-water region to know the newly established truth, that their beds of fossil shells furnish the best and cheapest of manures—as it is, that all should know in what manner, and by what general laws, these manures operate—how they produce benefit, and when they may be either worthless, or injurious. And this more important end, the author regrets to believe has as yet scarcely been even partially attained, by the dissemination and proper understanding of correct views of the subject. Of course it is not to be supposed that this Essay has been read, (if even heard of,) by one in ten of the many who have been prompted by verbal information, to attempt the practice it recommends; and of those who have read, and who have even expressed warm approbation of the work, it has seldom been found that their praise was discriminating, or founded upon a thorough examination of its reasoning and theoretical views, on which, whatever value it may possess, principally rests. For all persons who are so easily convinced, it may be truly said, that the volume embraced nothing more, and was worth no more, than would be found in these few words—"the application of calcareous manures will be found highly improving and profitable." It is not therefore at all strange, that the attentive reading of a volume to obtain this truth, was generally deemed unnecessary.

Though the first edition of this work has been nearly exhausted, the circulation has as yet been almost confined to a small portion of only the state of Virginia, in which the mode of improvement recommended had previously been successfully commenced, or had at least attracted much attention. But this district is not better fitted to be thus improved than the remainder of the great tide-water region, stretching from Long Island to Mobile—and to a great part of which, calcareous manures may be cheaply applied. It is only in parts of Maryland and Virginia that many extensive and highly profitable applications of fossil shells, or marl, have

been yet made: in North Carolina, the value of the manure has been but lately tried—in South Carolina and Georgia, no notice of it has been yet taken, or at least has not been made known—and in Florida and Alabama, (parts of which are peculiarly suited to receive these benefits,) it is most erroneously thought that such improvements are only profitable for old settled and impoverished countries. The farmers of Pennsylvania have gone far ahead of those in Virginia in manuring with lime—and it is believed (but upon no certain testimony) that in New Jersey, use has been made of the calcareous manure which in Virginia is called marl, as well as of the *green sand*, which they even still more erroneously call by the same name. But whatever may have been the extent of their use of calcareous manures of every kind, and however great their success, it is believed that our northern brethren have been as little directed by correct views of the operation of these manures, as those of the south, who have neglected them entirely.

But though the circulation of this work will be most useful through the great tide-water region, which is so generally supplied with underlying beds of fossil shells, and so much of the soil of which especially needs such manure—still the assertion may be ventured that there is no part of the country, where the views presented, if true, are not important to be known—and if known, would not be highly useful to aid the improvement of soils. It is to the general theory of the constitution of fertile and barren soils, that the attention and severe scrutiny of both scientific and practical agriculturists are invited—and to the several minor points there presented, which are either altogether new, or not established by authority: such as the doctrine of acidity in soils—of the incapacity of poor and acid soils to be enriched—and of the entire absence of carbonate of lime in most of the soils of this country.

The circumstances stated above, have induced the publication of a second edition as a supplement to the *Farmers' Register*, (and suited to be bound with either volume of that work,) which, in that form, may have the facility of distribution through the mail—and which may be offered at so low a price as to reach, as nearly as possible, that general circulation which is its author's main object.

This edition will contain nearly three-fourths more print than the first, (each page of this, containing as much as four and a half pages of that,) and yet will be sold at but little more than half the price. The new matter consists principally of more full explanations—additional and new proofs—and more full and minute directions for practical operations, designed especially for the use of those who are beginning to apply marl, and have every thing on the subject to learn.

April, 1835.

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ESSAY

ON

CALCAREOUS MANURES.

PART I—Theory.

CHAPTER I.

GENERAL DESCRIPTION OF EARTHS AND SOILS.

It is very necessary that we should correctly distinguish *earths* and *soils* and their many varieties: yet these terms are continually misapplied—and even among authors of high authority, no two agree in their definitions, or modes of classification. Where such differences exist, and no one known method is so free from material imperfections, as to be referred to as a common standard, it becomes necessary for every one who treats of soils, to define for himself—though perhaps he is thereby adding to the general mass of confusion already existing. This necessity must be my apology for whatever is new or unauthorized in the following definitions.

The *earths* important to agriculture, and which form nearly the whole of the known globe, are only three—*silicious aluminous*, and *calcareous*.

Silicious earths, in its state of absolute purity, forms rock crystal. The whitest and purest sand may be considered as silicious earth in agriculture, though none is presented by nature entirely free from other ingredients. It is composed of very hard particles, not soluble in any common acid, and which cannot be made coherent by mixing with water. Any degree of coherence, or any shade of color that sand may exhibit, is owing to the presence of other substances. The solidity of the particles of sand renders them impenetrable to water, which passes between them as through a sieve. The hardness of its particles, and their loose arrangement, make sand incapable of absorbing moisture from the atmosphere, or of retaining any valuable vapor or fluid, with which it may have been in any manner supplied. Silicious earth is also quickly heated by the sun, which adds to the rapidity with which it loses moisture.

Aluminous or *argillaceous earth*, when dry, adheres to the tongue, absorbs water rapidly and abundantly, and when wet, forms a tough paste, smooth and soapy to the touch. By burning it becomes as hard as stone. Clays derive their adhesiveness from their proportion of aluminous earth. This also is white when pure, but is generally colored deeply and variously—red, yellow, or blue—by metallic substances. When drying, aluminous earth shrinks greatly—it becomes a mass of very hard lumps, of various sizes, separated by cracks and fissures, which become so many little reservoirs of standing water, when filled by rains, and remain so, until the lumps, by

slowly imbibing the water, are distended enough to fill the space occupied before.

Calcareous earth, or *carbonate of lime*,* is *lime* combined with *carbonic acid*, and may be converted into pure or quick-lime by heat—and quick-lime, by exposure to the air, soon returns to its former state of calcareous earth. It forms marble, limestone, chalk, and shells, with very small admixtures of other substances. Thus the term *calcareous earth* will not be used here to include either *lime* in its pure state, or any of the numerous combinations which lime forms with the various acids, except that one (carbonate of lime) which is beyond comparison the most abundant throughout the world, and most important as an ingredient of soils. Pure lime attracts all acids so powerfully, that it is never presented by nature except in combination with some one of them, and generally with the carbonic acid. When this compound is thrown into any stronger acid, as muriatic, nitric, or even strong vinegar—the lime being more powerfully attracted, unites with, and is dissolved by the stronger acid, and lets go the carbonic, which escapes, with effervescence, in the form of air. In this manner, the carbonate of lime, or calcareous earth, may not only be easily distinguished from silicious, and aluminous earth, but also from all other combinations of lime. [See Appendix A.†]

* *Carbonate of lime* is the chemical name for the substance formed by the combination of *carbonic acid* with *lime*. The names of all the thousands of different substances (*neutral salts*) which are formed by the combination of each of the many acids with each of the various earths, alkalis, and metals, are formed by one uniform rule, which is as simple and easy to be understood and remembered, as it is useful. To avoid repeated explanations in the course of this essay, the rule will now be stated by which these compounds are named. The termination of the name of the acid is changed to the syllable *ate*, and then prefixed to the particular earth, alkali, or metal with which the acid is united. With this explanation, any reader can at once understand what is meant by each of some thousands of terms, none of which might have been heard of before, and which (without this manner of being named) would be too numerous to be fixed in the most retentive memory. Thus, it will be readily understood that the *carbonate of magnesia* is a compound of the carbonic acid and magnesia—the *sulphate of lime*, a compound of sulphuric acid and lime—the *sulphate of iron*, a compound of sulphuric acid and iron—and in like manner for all other terms so formed.

† The note referred to in the appendix A, will supply some remarks and explanations which a scientific reader would correctly consider as a deficiency if entirely omitted, but which, if added to the text above,

Calcareous earth in its different forms has been supposed to compose as much as one-eighth part of the crust of the globe.* Very extensive plains in France and England are of chalk, pure enough to be nearly barren, and to prove that pure calcareous earth would be entirely so. No chalk is to be found in our country—and it is only from European authors that we can know any thing of its agricultural characters, when nearly pure, or when forming a very large proportion of the surface of the land. The whiteness of chalk repels the rays of the sun, while its loose particles permit water to pass through, as easily as sand;† and thus calcareous earth is remarkable for possessing some of the worst qualities of both the other earths, and which it serves to cure in them (as will hereafter be shown) when used as a manure.

Most of those who have applied chemistry to agriculture, consider *magnesia* as one of the important earths.‡ *Magnesia*, like lime, is never found pure, but always combined with some acid, and its most general form is the carbonate of *magnesia*. But even in this, its usual and natural state, it exists in such very small quantities in soils, and is found so rarely, that its name seems a useless addition to the list of the earths of agriculture. For all practical purposes, gypsum (though only another combination of lime,) would more properly be arranged as a distinct earth, or element of soils, as it is found in far greater abundance and purity, and certainly affects some soils and plants in a far more important manner than has yet been attributed to *magnesia*, in its natural form.

All the earths, when as pure as they are ever furnished by nature, are entirely barren, as might be inferred from the description of their qualities: nor would any addition of putrescent manures§ enable either of the earths to support healthy vegetable life.

The mixture of the three earths in due proportions, will correct the defects of all, and with a sufficiency of animal or vegetable matter, putrescent, and soluble in water, a *soil* is formed in which plants can extend their roots freely, yet be firmly supported, and derive all their needful supplies of air, water, and warmth, without being oppressed by too much of either. Such is the natural surface of almost all the habitable world: and though the qualities and value of soils are as various as the proportions of their ingredients are innumerable, yet they are mostly so constituted, that no one earthy ingredient is so abundant, but that the texture¶ of the soil is mechanically suited to

some one valuable crop—as some plants require a degree of closeness, and others of openness in the soil, which would cause other plants to decline or perish.

Soil seldom extends more than a few inches below the surface, as on the surface only are received those natural supplies of vegetable and animal matters, which are necessary to constitute soil. Valleys subject to inundation have soils brought from higher lands, and deposited by the water, and therefore are of much greater depth. Below the soil is the *subsoil*, which is also a mixture of two or more earths, but is as barren as the unmixed earths, because it contains very little putrescent matter, the only food for plants.

The qualities and value of soils depend on the proportions of their ingredients. We can easily comprehend in what manner silicious and aluminous earths, by their mixture, serve to cure the defects of each other—the open, loose, thirsty, and hot nature of sand being corrected by, and correcting in turn, the close, adhesive, and water holding qualities of aluminous earth. This curative operation is merely mechanical—and in that manner it seems likely that calcareous earth, when in large proportions, also acts, and aids the corrective powers of both the other earths. This however is only supposition, as I have met with scarcely any such natural soil.

But besides the mechanical effects of calcareous earth, (which perhaps are weaker than those of the other two,) that earth has chemical powers far more effectual in altering the texture of soils, and for which a comparatively small quantity is amply sufficient. The chemical action of calcareous earth as an ingredient of soils, will be fully treated of hereafter: it is only mentioned in this place to avoid the apparent contradiction which might be inferred, if, in a general description of calcareous earth, I had omitted all allusion to qualities that will afterwards be brought forward as all important.

It seems most proper to class and name soils according to their *predominant* earthy ingredients, by which term, I mean those ingredients which exert the greatest power, and most strongly mark the character of the soil. The predominant ingredient (in this sense,) is not always the most abundant, and frequently is the least. If the most abundant was considered the predominant ingredient, and gave its name to the soil,* then almost every one should be called silicious, as that earth is seldom equalled in quantity by all the others united. If the earthy parts of a soil were two-thirds silicious, and one-third of aluminous earth, the peculiar qualities of the smaller ingredient would predominate over the opposing qualities of the sand, and the mixture would be a tenacious clay. If the same soil had contained only one-twentieth part of calcareous earth, that ingredient would have had more marked effects on the soil, than could have been produced by either doubling, or diminishing to half their quantity, the silicious and aluminous earths, which formed the great bulk of the soil. If soils were named according to certain proportions of their ingredients, (as proposed by Davy,†) a correct, though limited ana-

would have been useless and perhaps embarrassing to readers in general.

* Cleaveland's Mineralogy—On Carbonate of Lime.

† Cours Complet d'Agriculture, etc. par l'Abbé Rozier—*Terres*.

‡ Davy's Agr. Chem. page 110. Phil. Ed. 1821.

§ Putrescent or enriching manures, are those formed of vegetable and animal matters, capable of putrefying, and thereby furnishing soluble food to plants. Farm-yard and stable manure, and the weeds and other growth of the fields left to die and rot on them, are almost the only enriching manures that have been used as yet in this country.

¶ The texture of a soil means the disposition of its parts, which produces such sensible qualities, as being close, adhesive, open, friable, &c.

* Which is the plan of the nomenclature of soils proposed by Rozier—See article "*Terres*," Cours Complet d'Agriculture, etc. † Agr. Chem. p. 139.

lysis of a soil would be required, before its name or character could be given—and even then the name and character would often disagree. But every farmer can know what are the most marked good or bad qualities of his soils, as shown under tillage, and those qualities can be easily traced to their predominant ingredients. By compounding a few terms, various shades of difference may be designated with sufficient precision. A few examples will be sufficient to show how all may be applied:—

A *silicious* or *sandy soil* has such a proportion of silicious earth as to show more of its peculiar properties than those of any other ingredient. It would be more or less objectionable for its looseness, heat, and want of power to retain either moisture or putrescent manure—and not for toughness, liability to become hard after wet ploughing, or any other quality of aluminous earth.

In like manner, an *aluminous* or *clayey soil*, would show most strongly the faults of aluminous earth, though more than half its bulk might be of silicious.

The term *loam* is not essential to this plan, but it is convenient, as it will prevent the necessity of frequent compounds of other terms. It will be used for all soils formed with such proportions of sand and aluminous earth, as not to be light enough to be called sandy, nor stiff enough for clay soil. *Sandy loam* and *clayey loam* would express its two extremes—and *loamy sand* would be still lighter than the former, and *loamy clay* stiffer than the latter.

In all compound names of soils, the last term should be considered as expressing the predominant earthy ingredient. Thus, a *sandy loamy calcareous soil*, would be nearer to loam than sand, and more marked by its calcareous ingredient than either. Other ingredients of soils besides the earths, or any accidental or rare quality affecting their character considerably, may be described with sufficient accuracy by such additional terms as these—a *ferruginous gravelly silicious loam*—or a *vegetable calcareous clay*. [Appendix B.]

CHAPTER II.

ON THE SOILS, AND STATE OF AGRICULTURE OF THE TIDE-WATER DISTRICT OF VIRGINIA.

“During several days of our journey, no spot was seen that was not covered with a luxuriant growth of large and beautiful forest trees, except where they had been destroyed by the natives for the purpose of cultivation. The least fertile of their pasture lands, without seeding, are soon covered with grass several feet in height; and unless prevented by cultivation, a second growth of trees rapidly springs up, which, without care or attention, attain their giant size in half the time that would be expected on the best lands in England.”

If the foregoing description was met with in a “Journey through Hindoostan,” or some equally unknown region, no European reader would doubt but such lands were fertile in the highest degree—and even many of ourselves would receive the same impression. Yet it is no exaggerated ac-

count of the poorest natural soils in our own poor country, which are as remarkable for their producing luxuriant growths of pines, and broom grass, as for their unproductiveness in every cultivated or valuable crop. We are so accustomed to these facts, that we scarcely think of their singularity; nor of the impropriety of calling any land barren, which will produce a rapid growth of any one plant. Indeed, by the rapidity of that growth, (or the fitness of the soil for its production,) we have in some measure formed a standard of the poverty of the soil.

With some exceptions to every general character, the tide-water district of Virginia may be described as generally level, sandy, poor, and free from any fixed rock, or any other than stones rounded apparently by the attrition of water. On much the greater part of the lands, no stone of any kind is to be found, of larger size than gravel. Pines of different kinds form the greater part of a heavy cover to the silicious soils in their virgin state, and mix considerably with oaks, and other growth of clay land. Both these kinds of soil, after being exhausted of their little fertility by cultivation, and “turned out” to recruit, are soon covered by young pines which grow with vigor and luxuriance. This general description applies more particularly to the *ridges* which separate the *slopes* on different streams. The ridge lands are always level, and very poor—sometimes clayey, more generally sandy, but stiffer than would be inferred from the proportion of silicious earth they contain, which is caused by the fineness of its particles. Whortleberry bushes, as well as pines, are abundant on ridge lands—and numerous shallow basins are found, which are ponds of rain water in winter, but dry in summer. None of this large proportion of our lands, has paid the expense of clearing and cultivation, and much the greater part still remains under its native growth. Enough however has been cleared and cultivated in every neighborhood, to prove its utter worthlessness, under common management. The soils of ridge lands vary between sandy loam, and clayey loam. It is difficult to estimate their general product under cultivation; but judging from my own experience of such soils, the product may be from five bushels of corn, or as much of wheat, to the acre, on the most clayey soils, to twelve bushels of corn, and three of wheat on the most sandy—if wheat were there attempted to be made.

The *slopes* extend from the ridges to the streams, or to the alluvial bottoms, and include the whole interval between neighboring branches of the same stream. This class of soils forms another great body of lands—of a higher grade of fertility, though still far from valuable. It is generally more sandy than the poorer ridge land, and when long cultivated, is more or less deprived of its soil, by the washing of rains, on every slight declivity. The washing away of three or four inches in depth, exposes a sterile subsoil (or forms a “gall”) which continues thenceforth bare of all vegetation: a greater declivity of the surface serves to form gullies several feet in depth, the earth carried from which, covers and injures the adjacent lower land. Most of this kind of land has been cleared, and greatly exhausted. Its virgin growth is often more of oak, hickory, and dogwood, than pine—but when turned out of cultivation, an unmixed growth of pine follows. Land

of this kind in general has very little durability; its usual best product of corn may be for a few crops, eighteen or twenty bushels—and even as much as twenty-five bushels, from the highest grade. Wheat is seldom a productive or profitable crop on the slopes, the soil being generally too sandy. When such soils as these are called rich or valuable (as most persons would describe them,) those terms must be considered as only comparative—and such an application of them proves that truly fertile and valuable soils, are very scarce in Lower Virginia.

The only very rich and durable soils below the falls of our rivers, are narrow strips of highland along their banks, and the lowlands formed by the alluvion of the numerous smaller streams which water our country. These alluvial bottoms, though highly productive, are lessened in value by being generally too sandy, and by the damage they suffer from being often inundated by floods of rain. The best highland soils seldom extend more than half a mile from the river's edge—sometimes not fifty yards. These irregular margins are composed of loams of various qualities, but all highly valuable; and the best soils are scarcely to be surpassed, in their original fertility, and durability under severe tillage. Their nature and peculiarities will be again adverted to, and more fully described hereafter.

The simple statement of the general course of tillage to which our part of the country has been subjected, is sufficient to prove that great impoverishment of the soil has been the inevitable consequence. The small portion of rich river margins, was soon all cleared, and was tilled without cessation for many years. The clearing of the slopes was next commenced, and is not yet entirely completed. On these soils, the succession of crops was less rapid, or from necessity, tillage was sooner suspended. If not rich enough for tobacco when first cleared, (or as soon as it ceased to be so,) land of its kind was planted in corn two or three years in succession, and afterwards every second year. The intermediate year between the crops of corn, the field was "rested" under a crop of wheat, if it would produce four or five bushels to the acre. If the sandiness, or exhausted condition of the soil, denied even this small product of wheat, that crop was probably not attempted—and instead of it, the field was exposed to close grazing, from the time of gathering one crop of corn, to that of preparing to plant another. No manure was applied, except on the tobacco lots; and this rotation of a grain crop every year, and afterwards every second year, was kept up as long as the field would produce five bushels of corn to the acre. When reduced below that product, and to less than the necessary expense of cultivation, the land was turned out to recover under a new growth of pines. After twenty or thirty years, according to the convenience of the owner, the same land would be again cleared, and put under similar scouring tillage, which however would then much sooner end, as before, in exhaustion. Such a general system is not yet every where abandoned—and many years have not passed, since such was the usual course on almost every farm.

How much our country has been impoverished during the last fifty years, cannot be determined by any satisfactory testimony. But however we

may differ on this head, there are but few who will not concur in the opinion, that our system of cultivation has been every year lessening the productive power of our lands in general—and that no one county, no neighborhood, and but few particular farms, have been at all enriched, since their first settlement and cultivation. Yet many of our farming operations have been much improved within the last fifteen or twenty years. Driven by necessity, proprietors direct more personal attention to their farms—better implements of husbandry are used—every process is more perfectly performed—and whether well or ill directed, a spirit of inquiry and enterprise has been awakened, which before had no existence.

Throughout the country below the falls, and perhaps thirty miles above, if the best land be excluded, say one-tenth, the remaining nine-tenths will not yield an average product of ten bushels of corn to the acre; though that grain is best suited to our soils in general, and far exceeds in quantity all other kinds raised. Of course, the product of a large proportion of the land, would fall below this average. Such crops, in very many cases, cannot remunerate the cultivator. If our remaining woodland could be at once brought into cultivation, the gross product of the country would be greatly increased, but the net product very probably diminished—as the general poverty of these lands would cause more expense than profit to accompany their cultivation under the usual system. Yet every year we are using all our exertions to clear woodland, and in fact seldom increase either net or gross products—because nearly as much old exhausted land is turned out of cultivation as is substituted by the newly cleared. Sound calculations of profit and loss, would induce us to reduce the extent of our present cultivation, by turning out every acre that yields less than the total cost of its tillage.

No political truth is better established than that the population of every country will increase, or diminish, according to its regular supply of food. We know from the census of 1830, compared with those of 1820 and 1810, that our population is nearly stationary, and in some counties, is actually lessening; and therefore it is certain, that our agriculture is not increasing the amount of food, or the means of purchasing food—with all the assistance of the new land annually brought under culture. In these circumstances, a surplus population, with all its deplorable consequences, is only prevented by the great current of emigration which is continually flowing westward. No matter who emigrates, or with what motive—the enterprising or wealthy citizen who leaves us to seek richer lands and greater profits, and the slave sold and carried away on account of his owner's poverty, concur in producing the same result, though with very different degrees of benefit to those who remain. If this great and continued drain from our population was stopped, and our agriculture was not improved, want and misery would work to produce the same results. Births would diminish, and deaths would increase—and hunger and disease would keep down population to that number, that the average products of our agricultural and other labor could feed, and supply with other means of living.

A stranger to our situation and habits might well oppose to my statements the very reasonable objection, that no man would, or could, long pur-

sue a system of cultivation of which the returns fell short of his expenses, including rent of land, hire of labor, interest on the necessary capital, &c. Very true—if he had to pay those expenses out of his profits, he would soon be driven from his farm to a jail. But we own our land, our laborers, and stock—and though the calculation of net profit, or of loss, is precisely the same, yet we are not ruined by making only two per cent. on our capital, provided we can manage to live on that income. If we live on still less, we are actually growing richer (by laying up a part of our two per cent.,) notwithstanding the most clearly proved regular loss on our farming.

Our condition has been so gradually growing worse, that we are either not aware of the extent of the evil, or are in a great measure reconciled by custom to profitless labor. No hope for a better state of things can be entertained, until we shake off this apathy—this excess of contentment which makes no effort to avoid existing evils. I have endeavored to expose what is worst in our situation as farmers: if it should have the effect of rousing any of my countrymen to a sense of the absolute necessity of some improvement, to avoid ultimate ruin, I hope also to point out to some of their number, if not to all, that the means for certain and highly profitable improvements, are completely within their reach. [Appendix C.]

CHAPTER III.

THE DIFFERENT CAPACITIES OF SOILS FOR RECEIVING IMPROVEMENT.

As far as the nature of the subjects permitted, the foregoing chapters have been merely explanatory and descriptive. The same subjects will be resumed and more fully treated in the course of the following argument, the premises of which, are the facts and circumstances that have been detailed. What I wish to prove will be stated in a series of propositions, which will now be presented at one view, and afterwards separately discussed in their proper order.

Proposition 1. Soils naturally poor, and rich soils reduced to poverty by cultivation, are essentially different in their powers of retaining putrescent manures: and under like circumstances, the fitness of any soil to be enriched by these manures, is in proportion to what was its natural fertility.

2. The natural sterility of the soils of Lower Virginia is caused by such soils being destitute of calcareous earth, and their being injured by the presence and effects of vegetable acid.

3. The fertilizing effects of calcareous earth are chiefly produced by its power of neutralizing acids, and of combining putrescent manures with soils, between which there would otherwise be but little if any chemical attraction.*

* When any substance is mentioned as combining with one or more other substances, as different manures with each other, or with soil, I mean that a union is formed by chemical attraction, and not by simple mixture. Mixtures are made by mechanical means, and may be separated in like manner; but combinations are chemical, and require some stronger chemical attraction, to take away either of the bodies so united.

When two substances combine, they both lose their

4. Poor and acid soils cannot be improved durably, or profitably, by putrescent manures, without previously making them calcareous, and thereby correcting the defect in their constitution.

5. Calcareous manures will give to our worst soils a power of retaining putrescent manures, equal to that of the best—and will cause more productiveness, and yield more profit, than any other improvement practicable in Lower Virginia.

Dismissing from consideration, for the present, all the others, I shall proceed to maintain the

FIRST PROPOSITION.

Soils naturally poor, and rich soils reduced to poverty by cultivation, are essentially different in their powers of retaining putrescent manures: and under like circumstances, the fitness of any soil to be enriched by these manures, is in proportion to what was its natural fertility.

The natural fertility of a soil is not intended to be estimated by the amount of its earliest product, when first brought under cultivation, because several temporary causes then operate either to keep down, or to augment the product. If land be cultivated immediately after the trees are cut down, the crop is greatly lessened by the numerous living roots, and consequent bad tillage—the excess of unrotted vegetable matter, and the coldness of the soil, from which the rays of the sun had been so long excluded. On the other hand, if cultivation is delayed one or two years, the leaves and other vegetable matters are rotted, and in the best state to supply food to plants, and are so abundant, that a far better crop will be raised than could have been obtained before, or perhaps will be again, without manure. For these reasons, the degree of natural fertility of any soil should be measured by its products after these temporary causes have ceased to act, which will generally take place before the third or fourth crop is gathered. According, then, to this definition, a certain degree of permanency in its early productiveness, is necessary to entitle a soil to be termed *naturally fertile*. It is in this sense, that I deny to any poor lands, except such as were naturally fertile, the capacity of being made rich by putrescent manures only.

The foregoing proposition would by many persons be so readily admitted as true, that attempting to prove it would be deemed entirely superfluous. But many others will as strongly deny its truth, and can support their opposition by high agricultural authorities.

General readers, who may have no connexion with farming, must have gathered from the incidental notices in various literary works, that some countries or districts that were noted for their uncommon fertility or barrenness, as far back as any accounts of them have been recorded, still retain the same general character, through every change of policy, government, and even of the race of

previous peculiar qualities, or *neutralize* them for each other, and form a third substance different from both. Thus, if certain known proportions of muriatic acid, and pure or caustic soda, be brought together, their strong attraction will cause them to combine immediately. The strong corrosive acid quality of the one, and the equally peculiar alkaline taste and powers of the other, will *neutralize* or entirely destroy each other—and the compound formed, is common salt, the qualities of which are as strongly marked, but totally different from those of either of its constituent parts.

inhabitants. They know that for some centuries at least, there has been no change in the strong contrast between the barrenness of Norway, Brandenburg, and the Highlands of Scotland, and the fertility of Lombardy and Valencia. Sicily, notwithstanding its government is calculated to discourage industry, and production of every profitable kind, still exhibits that fertility for which it was celebrated two thousand years ago. It seems a necessary inference from the many statements of which these are examples, that the labors of man have been but of little avail in altering permanently the characters and qualities given to soils by nature.

Most of our experienced practical cultivators, through a different course, have arrived at the same conclusion. Their practice has taught them the truth of this proposition—and the opinions thus formed have profitably directed their most important operations. They are accustomed to estimate the worth of land by its natural degree of fertility—and by the same rule they are directed on what soils to bestow their scanty stock of manure, and where to expect exhausted fields to recover by rest, and their own unassisted powers. But content with knowing the fact, this useful class of farmers have never inquired for its cause—and their opinions on this subject, as on most others, have not been communicated so as to benefit others.

But if all literary men who are not farmers, and all practical cultivators who seldom read, admitted the truth of my proposition, it would avail but little for improving our agricultural operations—and the only prospect of its being usefully disseminated, is through that class of farmers who have received their first opinions of improving soils, from books, and whose subsequent plans and practices have grown out of those opinions. If poor natural soils cannot be durably or profitably improved by putrescent manures, this truth should not only be known, but be kept constantly in view, by every farmer who can hope to improve with success. Yet it is a remarkable fact, that the difference in the capacities of soils for receiving improvement, has not attracted the attention of scientific farmers—and the doctrine has no direct and positive support from the author of any treatise on agriculture, English or American, that I have been able to consult. On the contrary, it seems to be considered by all of them, that to collect and apply as much vegetable and animal manure as possible, is sufficient to ensure profit to every farmer, and fertility to every soil. They do not tell us that numerous exceptions to that rule will be found, and that many soils of apparent good texture, if not incapable of being enriched from the barn-yard, would at least cause more loss than clear profit, by being improved from that source.

When it is assumed that the silence of every distinguished author as to certain soils being incapable of being profitably enriched, amounts to ignorance of the fact, or a tacit denial of its truth—it may be objected that the exception was not omitted from either of these causes, but because it was established and undoubted. This is barely possible: but even if such was the case, their silence has had all the ill consequences that could have grown out of a positive denial of any exceptions to the propriety of manuring poor soils. Every zealous young farmer, who draws most of

his knowledge and opinions from books, adopts precisely the same idea of their directions—and if he owns barren soils he probably throws away his labor and manure for their improvement, for years, before experience compels him to abandon his hopes, and acknowledge that his guides have led him only to failure and loss. Such farmers as I allude to, by their enthusiasm and spirit of enterprise, are capable of rendering the most important benefits to agriculture. Whatever may be their impelling motives, the public derives nearly all the benefit of their successful plans—and their far more numerous misdirected labors, and consequent disappointments, are productive of national, still more than individual loss. The occurrence of only a few such mistakes, made by reading farmers, will serve to acquit me of combating a shadow—and there are few of us who cannot recollect some such examples.

But if the foregoing objection has any weight in justifying European authors in not naming this exception, it can have none for those of our own country. If it is admitted that soils naturally poor are incapable of being enriched with profit, that admission must cover three-fourths of all the high-land in the tide-water district. Surely no one will contend that, so sweeping an exception was silently understood by the author of *Arator*, as qualifying his exhortations to improve our lands: and if no such exception was intended to be made, then will his directions for enriching soils, and his promises of reward, be found equally fallacious, for the greater portion of the country, to benefit which his work was specially intended. The omission of any such exception by the writers of the United States, is the more remarkable, as the land has been so recently brought under cultivation, that the original degree of fertility of almost every farm may be known to its owner, and compared with the after progress of exhaustion or improvement.

Many authorities might be adduced to prove that I have correctly stated what is the fair and only inference to be drawn from agricultural books, respecting the capacity of poor soils to receive improvement. But a few of the most strongly marked passages in *Arator* will be fully sufficient for this purpose. The venerated author of that work was too well acquainted with the writings of European agriculturists, to have mistaken their doctrines in this important particular. A large portion of his useful life was devoted to the successful improvement of exhausted, but originally fertile lands. His instructions for producing similar improvements are expressly addressed to the cultivators of the eastern parts of Virginia and North Carolina, and are given as applicable to all our soils, without exception. Considering all these circumstances, the conclusions which are evidently and unavoidably deduced from his work, may be fairly considered, not only as supported by his own experience, but as concurring with the general doctrine of improving poor soils, maintained by previous writers.

At page 54, third edition of *Arator*, "*inclosing*" (i. e. leaving fields to receive their own vegetable cover, for their improvement during the years of rest,) is said to be "the most powerful means of fertilizing the earth"—and the process is declared to be rapid, the returns near, and the gain great.

Page 61. "If these few means of fertilizing

"the country [cornstalks, straw, and animal dung,] were skilfully used, they would of themselves suffice to change its state from sterility to fruitfulness."—"By the litter of Indian corn, and of small grain, and of penning cattle, managed with only an inferior degree of skill, in union with inclosing, I will venture to affirm that a farm may in ten years be made to double its produce, and in twenty to quadruple it."

No opinions could be more strongly or unconditionally expressed than these. No reservation or exception is made. I may safely appeal to each of the many hundreds who attempted to obey these instructions, to declare whether any one considered his own naturally poor soils excluded from the benefit of these promises—or whether a tithe of that benefit was realized on any farm composed generally of such soils. In a field of mine that has been secured from grazing since 1814, and cultivated on the four shift rotation, the produce of a marked spot has been measured every fourth year (when in corn) since 1820. The difference of product has been such as the differences of season might have caused—and the last crop (in 1828) was worse than those of either of the two preceding rotations. There is no reason to believe that even the smallest increase of productive power has taken place.

It is far from my intention, by these remarks, to deny the propriety, or to question the highly beneficial results, of applying the system of improvement recommended by Arator, to soils originally fertile. On the contrary, it is as much my object to maintain the facility of restoring to worn lands their natural degree of fertility, by vegetable applications, as it is to deny the power of exceeding that degree, however low it may have been.

One more quotation will be offered, because its recent date and the source whence it is derived, furnish the best proof that it is still the received opinion among agricultural writers, that all soils may be profitably improved, by putrescent manures. An article in the *American Farmer*, of October 14th, 1831, on "manuring large farms," by the editor, contains the following expressions. "—By proper exertions, every farm in the United States can be manured with less expense than the surplus profits arising from the manure would come to. This we sincerely believe, and we have arrived at this conclusion from long and attentive observation. We never yet saw a farm that we could not point to means of manuring, and bring into a state of high and profitable cultivation at an expense altogether inconsiderable when contrasted with the advantages to be derived from it." The remainder of the article shows that putrescent manures are principally relied on to produce these effects: marsh and swamp mud are the only kinds referred to that are not entirely putrescent in their action, and mud certainly cannot be used to manure every farm. Mr. Smith, having been long the conductor of a valuable agricultural journal, as a matter of course, is extensively acquainted with the works and opinions of the best writers on agriculture; and therefore, his advancing the foregoing opinions, as certain and undoubted, is as much a proof of the general concurrence of preceding writers, as if the same had been given as a digest of their precepts.

Some persons will readily admit the great differ-

ence in the capacities of soils for improvement, but consider a deficiency of clay only to cause the want of power to retain manures. The general excess of sand in our poor lands might warrant this belief in a superficial and limited observer. But though clay soils are more rarely met with, they present, in proportion to their extent, full as much poor land. The most barren and worthless soils in the county of Prince George, are also the stiffest. A poor clay soil, will retain manure longer than a poor sandy soil—but it will not the less certainly lose its acquired fertility at a somewhat later period. When it is considered that a much greater quantity of manure is required by clay soils, it may well be doubted whether the improvement of the sandy soils would not be attended with more profit—or more properly speaking, with less actual loss.

It is true that the capacity of a soil for improvement is greatly affected by its texture, shape of the surface, and its supply of moisture. Dry, level, clay soils, will retain manure longer, than if they were sandy, hilly, or wet. But however important these circumstances may be, neither the presence or absence of any of them can cause the differences of capacity for improvement. There are rich and valuable soils with one or more of all these faults—and there are soils the least capable of receiving improvement, free from objection as to their texture, degree of moisture, or inclination of their surface. Indeed the great body of our poor ridge lands, is more free from faults of this kind, than soils of far greater productiveness usually are. Unless then some other and far more powerful obstacle to improvement exists, why should not all our woodland be highly enriched, by the hundreds, or thousands, of crops of leaves which have successively fallen and rotted there? Notwithstanding this vegetable manuring, which infinitely exceeds all that the industry and patience of man can possibly equal, most of our woodland remains poor—and this one fact (which at least is indisputable,) ought to satisfy all of the impossibility of enriching such soils by putrescent manures only. Some few acres may be highly improved, by receiving all the manure derived from the offal of the whole farm—and entire farms, in the neighborhood of towns, may be kept rich by continually applying large quantities of purchased manures. But no where can a farm be found, which has been improved beyond its original fertility, by means of the vegetable resources of its own arable fields. If this opinion is erroneous, nothing is easier than to prove my mistake, by adducing undoubted examples of such improvements having been made.

But a few remarks will suffice on the capacity for improvement of worn lands, which were originally fertile. With regard to these soils, I have only to concur in the received opinion of their fitness for durable and profitable improvement by putrescent manures. After being exhausted by cultivation, they will recover their productive power, by merely being left to rest for a sufficient time, and receiving the manure made by nature, of the weeds and other plants that grow and die upon the land. Even if robbed of the greater part of that supply, by the grazing of animals, a still longer time will serve to obtain the same result. The better a soil was at first, the sooner it will recover by these means, or by artificial manuring. On

soils of this kind, the labors of the improving farmer meet with success and reward—and whenever we hear of remarkable improvements of poor land by putrescent manures, further inquiry will show us that these poor lands had once been rich.

The continued fertility of certain countries for hundreds or even thousands of years, does not prove that the land could not be, or had not been, exhausted by cultivation: but only that it was slow to exhaust and rapid in recovering—so that whatever repeated changes may have occurred in each particular tract, the whole country taken together always retained a high degree of productiveness. Still the same rule will apply to the richest and the poorest soils—that each exerts strongly a force to retain as much fertility as nature gave them—and that when worn and reduced, each may easily be restored to its original state, but cannot be raised higher, with either durability or profit by putrescent manures, whether applied by the bounty of nature, or the industry of man.

CHAPTER IV.

EFFECTS OF THE PRESENCE OF CALCAREOUS EARTH IN SOILS.

PROPOSITION 2. *The natural sterility of the soils of Lower Virginia is caused by such soils being destitute of calcareous earth, and their being injured by the presence and effects of vegetable acid.*

The means which would appear the most likely to lead to the causes of the different capacities of soils for improvement, is to inquire whether any known ingredient or quality is always to be found belonging to improvable soils, and never to the unimprovable—or which always accompanies the latter, and never the former kind. If either of these results can be obtained, we will have good ground for supposing that we have discovered the general cause of fertility, in the one case—or of barrenness, in the other: and it will follow, that if we can supply to barren soils the deficient beneficial ingredient—or can destroy that which is injurious to them—that their incapacity for receiving improvement will be removed. All the common ingredients of soils, as sand, clay, or gravel—and such qualities as moisture or dryness—a level, or a hilly surface—however they may affect the value of soils, are each sometimes found exhibited in a remarkable degree, in both the fertile and the sterile. The abundance of putrescent vegetable matter might well be considered the cause of fertility, by one who judged only from lands long under cultivation. But though vegetable matter in sufficient quantity is essential to the existence of fertility, yet will this substance also be found inadequate, as its cause. Vegetable matter abounds in all rich land, it is admitted; but it has also been furnished by nature, in quantities exceeding all computation, to the most barren soils we own.

But there is one ingredient of which not the smallest proportion can be found in any of our poor soils, and which, wherever found, indicates a soil remarkable for natural and durable fertility. This is *calcareous earth*. These facts alone, if sustained, will go far to prove that this earth is the cause of fertility, and the cure for barrenness.

On some part of most farms touching tide-water, either muscle or oyster shells are found mixed with the soil. Oyster shells are confined to the lands on salt water, where they are very abundant, and sometimes extend through large fields. Higher up the rivers, muscle shells only are to be seen thus deposited by nature, and they decrease as we approach the falls of the rivers. The proportion of shelly land in the counties highest on tide-water, is very small—but the small extent of these spots does not prevent, but rather aids, the investigation of the peculiar qualities of such soils. Spots of shelly land, not exceeding a few acres in extent, could not well have been cultivated differently from the balance of the fields of which they formed parts—and therefore they can be better compared with the worse soils under like treatment. Every acre of shelly land is, or has been, remarkable for its richness, and still more for its durability. There are few farmers among us who have not heard described tracts of shelly soil on Nansemond and York Rivers, which are celebrated for their long resistance of the most exhausting system of tillage, and which still remain fertile, notwithstanding all the injury which they must have sustained from their severe treatment. We are told that on some of these lands, corn has been raised every successive year, without any help from manure, for a longer time than the owners could remember, or could be informed of, correctly. But without relying on any such remarkable cases, there can be no doubt but that every acre of our shelly land has been at least as much tilled, and as little manured, as any in the country; and that it is still the richest and most valuable of all our old cleared land.

The fertile but narrow strips along the banks of our rivers, (which form the small portion of our highland of first rate quality,) seldom extend far without exhibiting spots in which shells are visible, so that the eye alone is sufficient to prove the soil of such places to be calcareous. The similarity of natural growth, and of all other marks of character are such, that the observer might very naturally infer that the former presence of shells had given the same valuable qualities to all these soils—but that they had so generally rotted, and been incorporated with the other earths, that they remained visible only in a few places, where they had been most abundant. The accuracy of this inference will hereafter be examined.

The natural growth of the shelly soils, (and of those adjacent of similar value,) is entirely different from that of the great body of our lands. Whatever tree thrives well on the one, is seldom found on the other class of soils—or if found, it shows plainly by its imperfect and stunted condition, on how unfriendly a soil it is placed. To the rich river margins are almost entirely confined the black or wild locust, hackberry or sugar nut tree, and papaw. The locust is with great difficulty eradicated, or the newer growths kept under on cultivated lands; and from the remarkable rapidity with which it springs up, and increases in size, it forms a serious obstacle to the cultivation of the river banks. Yet on the woodland only a mile or two from the river, not a locust is to be seen. On shelly soils, pines and broom grass cannot thrive, and are rarely able to maintain even the most sickly growth.

Some may say that these striking differences of

growth do not so much show a difference in the constitution of the soils, as in their state of fertility—or that one class of the plants above named delights in rich, and the other, in poor land. No plant prefers poor to rich soil—or can thrive better on a scarcity of food, than with an abundant supply. Pine, broom grass, and sorrel, delight in a class of soils that are generally unproductive—but not on account of their poverty—for all these plants show, by the greater or less vigor of their growth, the abundance or scarcity of vegetable matter in the soil. But on this class of soils, no quantity of vegetable manure could make locusts flourish, though they will grow rapidly on a calcareous hillside, from which all the soil capable of supporting other plants, has been washed away.

In thus describing and distinguishing soils by their growth, let me not be understood as extending those rules to other soils and climates than our own. It is well established that changes of kind in successive growths of timber have occurred in other places, without any known cause—and a difference of climate will elsewhere produce effects, which here would indicate a change of soil.

Some rare exceptions to the general fertility of shelly lands are found where the proportion of calcareous earth is in great excess. Too much of this ingredient causes even a greater degree of sterility than its total absence. This cause of barrenness is very common in France and England (on chalk soils,) and very extensive tracts are not worth the expense of cultivation, or improvement. The few small spots that are rendered barren here, are seldom (if ever) so affected by the excess of oyster or muscle shells in the soil. These effects generally are caused by beds of fossil sea shells, which in some places reach the surface, and are thus exposed to the plough. These spots are not often more than thirty feet across, and their nature is generally evident to the eye; and if not, is so easily determined by chemical tests, as to leave no reason for confounding the injurious and beneficial effects of calcareous earth. This exception to the general fertilizing effect of this ingredient of our soils, would scarcely require naming, but to mark what might be deemed an apparent contradiction. But this exception, and its cause, must be kept in mind, and considered as always understood and admitted throughout all my remarks, and which therefore it is not necessary to name specially, when the general qualities of calcareous earth are spoken of.

In the beginning of this chapter, I advanced the important fact that none of our poor soils contain naturally the least particle of calcareous earth. So far, this is supported merely by my assertion—and all those who have studied agriculture in books, will require strong proof before they can give credit to the existence of a fact, which is either unsupported, or indirectly denied, by all written authority. Others, who have not attended to such descriptions of soils in general, may be too ready to admit the truth of my assertion—because, not knowing the opinions on this subject heretofore received and undoubted, they would not be aware of the importance of their admission.

It is true that no author has said expressly that every soil contains calcareous earth. Neither has any one stated that every soil contains some silicious, or aluminous earth. But the manner in which each has treated of soils and their constitu-

ent parts, would cause their readers to infer, that neither of these three earths is ever entirely wanting—or at least that the entire absence of the calcareous, is as rare as the absence of silicious or aluminous earth. Nor are we left to gather this opinion solely from indirect testimony, as the following examples, from the highest authorities, will prove. Davy says, “four earths generally abound in soils, the aluminous, the silicious, the calcareous, and the magnesian”^{*}—and the soils of which he states the constituent parts, obtained by chemical analysis, as well as those reported by Kirwan, and by Young, all contain some proportion (and generally a large proportion) of calcareous earth.[†] Kirwan states the component parts of a soil which contained thirty-one per cent. of calcareous earth, and he supposes that proportion neither too little nor too much.[‡] Young mentions soils of extraordinary fertility containing seventeen and twenty per cent., besides others with smaller proportions of calcareous earth—and says that Bergman found thirty per cent. in the best soil he examined.[¶] Rozier speaks still more strongly for the general diffusion, and large proportions of this ingredient of soils. In his general description of earths and soils, he gives examples of the supposed composition of the three grades of soils, which he designates by the terms *rich*, *good*, and *middling soils*: to the first class he assigns a proportion of one-tenth, to the second, one-fourth, and to the last, one-half of its amount, of calcareous earth. The fair interpretation of the passage is that the author considered these large proportions as general, in France—and he gives no intimation of any soil entirely without calcareous earth.[§]

American writers also suppose the general presence of this ingredient of soil: but their opinions on this subject are merely echos of European descriptions of soils. They seem neither to have suspected that so important a difference existed, nor to have made the least investigation by actual analysis, to sustain the false character thus given to the soils of our country. [Appendix D.]

With my early impressions of the nature and composition of soils, derived from the general descriptions given in books, it was with surprise, and some distrust, that when first attempting to analyze soils, in 1817, I found most specimens destitute of calcareous earth. The trials were repeated with care and accuracy, on soils from various places—until I felt authorized to assert without

^{*}Davy's Agr. Chem. Lecture 1.

[†]Agr. Chem. Lect. 4.—Kirwan on Manures—and Young's Prize Essay on Manures.

[‡]Kirwan on Manures, article Clayey Loam.

[¶]Young's Essay on Manures.

[§]“Composition of soils. Examples of the various composition of soils: *Rich soil*, silicious earth, 2 parts; aluminous, 6; calcareous, 1; vegetable earth, [*humus*] 1; in all, 10 parts. *Good soil*—silicious, 3 parts; aluminous 4; calcareous 2½; vegetable earth, ½ of 1 part; in all, 10 parts. *Middling soil* [*sol mediocre*], silicious, 4 parts; aluminous, 1; calcareous, 5 parts, less by some atoms of vegetable earth; in all, 10 parts. We see that it is the largest proportion of aluminous earth, that constitutes the greatest excellence of soils; and we know that independently of their harmony of composition, they require a sufficiency of depth.”—From the article “*Terres*,” in the “*Cours Complet d'Agriculture Pratique*, etc. par L'Abbé Rozier, 1815.

fear of contradiction, that no naturally poor soil, below the falls of the rivers, contains the smallest proportion of calcareous earth. Nor do I believe that any exception to this peculiarity of constitution can be found in any poor soil above the falls: but though these are far more extensive and important in other respects, they are beyond the district within the limits of which I propose to confine my investigation.

These results are highly important, whether considered merely as serving to establish my proposition, or as showing a radical difference between most of our soils, and those of the best cultivated parts of Europe. Putting aside my argument to establish a particular theory of improvement, the ascertained fact of the universal absence of calcareous earth in our poor soils leads to this conclusion—that profitable as calcareous manures have been found to be in countries where the soils are generally calcareous in some degree, they must be far more so on our soils that are quite destitute of that necessary earth.

CHAPTER V.

RESULTS OF THE CHEMICAL EXAMINATIONS OF VARIOUS SOILS.

PROPOSITION 2. Continued.

The certainty of any results of chemical analysis would be doubted by most persons who have paid no attention to the means employed for such operations: and their incredulity will be the more excusable, when such results are reported by one knowing very little of the science of chemistry, and whose limited knowledge was gained without aid or instruction, and was sought solely with the view of pursuing this investigation. Appearing under such disadvantages, it is therefore the more incumbent on me to show my claim to accuracy, or so to explain my method, as to enable others to detect its errors, if any exist. To analyze a specimen of soil completely, requires an amount of scientific acquirement and practical skill, to which I make no pretension. But merely to ascertain the absence of calcareous earth—or if present, to find its quantity—requires but little skill, and less science.

The methods recommended by different agricultural chemists for ascertaining the proportion of calcareous earth in soils, agree in all material points. Their process will be described, and made as plain as possible. A specimen of soil of convenient size is dried, pounded, and weighed, and then thrown into muriatic acid, diluted with three or four times its quantity of water. The acid combines with, and dissolves the *lime* of the calcareous earth, and its other ingredient, the *carbonic acid*, being disengaged, rises through the liquid in the form of *gas*, or air, and escapes with effervescence. After the mixture has been well shaken, and has stood until all effervescence is over, (the fluid still being somewhat acid to the taste, to prove that enough acid had been used, by some excess being left,) the whole is poured into a piece of blotting paper folded so as to fit within a glass funnel. The fluid containing the dissolved lime passes through the paper, leaving behind the clay and silicious sand, and any other solid matter; over which pure water is poured and passed off seven

times, so as to wash off all remains of the dissolved lime. These filtered washings are added to the solution, to all of which is then poured a solution of *carbonate of potash*. The two dissolved salts thus thrown together, (*muriate of lime*, composed of muriatic acid and lime—and *carbonate of potash*, composed of carbonic acid and potash,) immediately decompose each other, and form two new combinations. The muriatic acid leaves the lime, and combines with the potash, for which it has a stronger attraction—and the *muriate of potash* thus formed, being a soluble salt, remains dissolved and invisible in the water. The lime and carbonic acid being in contact, when let loose by their former partners, instantly unite, and form *carbonate of lime*, or calcareous earth, which being insoluble, falls to the bottom, is separated by filtering paper, is washed, dried and weighed, and thus shows the proportion contained by the soil.*

In this process, the carbonic acid which first composed part of the calcareous earth, escapes into the air, and another supply is afterwards furnished from the decomposition of the *carbonate of potash*. But this change of one of its ingredients does not alter the quantity of the calcareous earth, which is always composed of certain invariable proportions of its two component parts; and when all the lime has been precipitated as above directed, it will necessarily be combined with precisely its first quantity of carbonic acid.

This operation is so simple, and the means for conducting it so easy to obtain, that it will generally be the most convenient mode for finding the proportion of calcareous earth in those manures that are known to contain it abundantly, and where an error of a few grains cannot be very material. But if a very accurate result is necessary, this method will not serve, on account of several causes of error which always occur. Should no calcareous earth be present in a soil thus analyzed, the muriatic acid will take up a small quantity of aluminous earth, which will be precipitated by the *carbonate of potash*, and without further investigation, would be considered as so much calcareous earth. And if any compounds of lime and vegetable acids are present, (which for reasons hereafter to be stated, I believe to be not uncommon in soils,) some portion of them may be dissolved, and appear in the result as *carbonate of lime*, though not an atom of that substance was in the soil. Thus, every soil examined by this method of precipitation, will yield some small result of what would appear as calcareous earth, though actually destitute of such an ingredient. The inaccuracies of this method were no doubt known (though passed over without notice) by Davy, and other men of science who have recommended its use: but as they considered calcareous earth merely as one of the earthy ingredients of soil, operating mechanically, (as do sand and clay,) on the texture of the soil, they would scarcely suppose that a difference of a grain or two could materially affect the practical value of an analysis, or the character of the soil under examination.†

*More full directions for the analysis of soils may be found in Kirwan's Essay on Manures, Rozier's Dictionary, and Davy's Agricultural Chemistry: and of calcareous manures in Appendix E.

†"Chalks, calcareous marls, or powdered limestone,

The pneumatic apparatus proposed by Davy,* as another means for showing the proportion of calcareous earth in soils, is liable to none of these objections; and when some other causes of error peculiar to this method, are known and guarded against, its accuracy is almost perfect, in ascertaining the quantity of calcareous earth—to which substance alone, its use is limited. The correctness of this mode of analysis depends on two well established facts in chemistry—1st. That the component parts of calcareous earth always bear the same proportion to each other—and these proportions are as forty-three parts (by weight) of carbonic acid, to forty-seven of lime. 2nd. That the carbonic acid gas which two grains of calcareous earth will yield, is equal in bulk to one ounce of fresh water. The process with the aid of this apparatus disengages, confines, and measures the gas evolved—and for every measure equal to the bulk of an ounce of water, the operator has only to allow two grains of calcareous earth in the soil acted on. It is evident that the result can indicate the presence of lime in no other combination except that which forms calcareous earth—nor of any other earth, except carbonate of magnesia, which, if present, might be mistaken for calcareous earth, but which is too rare, and occurs in proportions too small, to cause any material error.

But if it is only desired to know whether calcareous earth is entirely wanting in any soil—or to test the truth of my assertion that so great a proportion of our soils are destitute of that earth—it may be done with far more ease than by either of the foregoing methods, and without apparatus of any kind. Let a handful of the soil (without drying or weighing) be thrown into a large drinking glass, containing enough of pure water to cover the soil about two inches. Stir it until all the lumps have disappeared, and the water has certainly taken the place of all the atmospheric air which the soil had enclosed. Remove any vegetable fibres, or froth, from the surface of the liquid, so as to have it clear. Then pour in gently about a table spoonful of undiluted muriatic acid, which by its greater weight will sink, and penetrate the soil, without any agitation being necessary for that purpose. If any calcareous earth is present it will quickly begin to combine with the acid, throwing off its carbonic acid in gas, which cannot fail to be observed as it escapes, as the gas that only eight grains of calcareous earth would throw out, would be equal in bulk to a gill measure. Indeed, the product of only a single grain of calcareous earth, would be abundantly plain to the eye of the careful operator, though it might be the whole amount of gas from two thousand grains of soil. If no effervescence is seen even after adding more acid and gently stirring the mixture, then it is absolutely certain that the soil contained not the

smallest portion of carbonate of lime—nor of the only other substance which might be mistaken for it, the carbonate of magnesia.

The examinations of all the soils that will be here mentioned, were made in the pneumatic apparatus, except some of those which evidently evolved no gas, and when no other result was required. As calcareous earth is plainly visible to the eye in all shelly soils, they only need examination to ascertain its proportion. A few examples will show what proportions we may find, and how greatly they vary, even in soils apparently of equal value.

1. Soil, a black clayey loam, from the top of the high knoll at the end of Coggin's Point, on James River, containing fragments of muscle shells throughout. Never manured and supposed to have been under scourging cultivation and close grazing from the first settlement of the country: then (1818) capable of producing twenty-five or thirty bushels of corn—and the soil well suited to wheat. One thousand grains, cleared by a fine sieve of all coarse shelly matter, (as none can act on the soil until minutely divided,) yielded sixteen ounce measures of carbonic acid gas, which showed the finely divided calcareous earth to be thirty-two grains.

2. One thousand grains of similar soil from another part of the same field, treated in the same manner, gave twenty-four grains of finely divided calcareous earth.

3. From the east end of a small island, at the end of Coggin's Point, surrounded by the river, and tide marsh. Soil, dark brown loam, much lighter than the preceding specimens, though not sandy—under like exhausting cultivation—then capable of bringing thirty to thirty-five bushels of corn—not a good wheat soil, ten or twelve bushels being probably a full crop. One thousand grains yielded eight grains of coarse shelly matter, and eighty-two of finely divided calcareous earth.

4. From a small spot of sandy soil, almost bare of vegetation, and incapable of producing any grain, though in the midst of very rich land, and cleared but a few years. Some small fragments of fossil sea shells being visible, proved this barren spot to be calcareous, which induced its examination. Four hundred grains yielded eighty-seven of calcareous earth—nearly twenty-two per cent. This soil was afterwards dug and carried out as manure.

5. Black friable loam, from Indian Fields, on York River. The soil was a specimen of a field of considerable extent, mixed throughout with oyster shells. Though light and mellow, the soil did not appear to be sandy. Rich, durable, and long under exhausting cultivation.

1260 grains of soil yielded

168 — of coarse shelly matter, separated mechanically,

8 — finely divided calcareous earth.

The remaining solid matter, carefully separated, (by agitation and settling in water,) consisted of 130 grains of fine clay, black with putrescent matter, and which lost more than one-fourth of its weight by being exposed to a red heat,

875 — white sand, moderately fine,

20 — very fine sand,

36 — lost in the process.

**act merely by forming a useful earthy ingredient in the soil, and their efficacy is proportioned to the deficiency of calcareous matter, which in larger or smaller quantities seems to be an essential ingredient of all fertile soils; necessary perhaps to their proper texture, and as an ingredient in the organs of plants.*" [Davy's Agr. Chem. page 21—and further on he says] "Chalk and marl or carbonate of lime only improve the texture of a soil, or its relation to absorption; it acts merely as one of its earthy ingredients."

*See the plate and description in Lecture IV of Agricultural Chemistry.

6. Oyster shell soil of the best quality from the farm of Wills Cowper, Esq. on Nansemond River—never manured, and supposed to have been cultivated in corn as often as three years in four, since the first settlement of the country—now yields (by actual measurement) thirty bushels of corn to the acre—but is very unproductive in wheat. A specimen taken from the surface to the depth of six inches, weighed altogether 242 dwt., which consisted of

- 126 — of shells and their fragments, separated by the sieve,
116 — remaining finely divided soil.

Of the finely divided part, 500 grains consisted of 18 grains of carbonate of lime,

- 330 — silicious sand—none very coarse,
94 — impalpable aluminous and silicious earth,
35 — putrescent vegetable matter—none coarse or unrotted,
23 — loss.

500

It is unnecessary to cite any particular trials of our poor soils, as it has been stated in the preceding chapter that all are entirely destitute of calcareous earth—excluding the rare, but well marked exceptions of its great excess, of which an example has been given in the soil marked 4, in the foregoing examinations.

Unless then I am mistaken in supposing that these facts are universally true, the certain results of chemical analysis completely establish these general rules—viz:

That all calcareous soils are naturally fertile and durable in a very high degree—and

That all soils naturally poor are entirely destitute of calcareous earth.

It then can scarcely be denied that calcareous earth must be the cause of the fertility of the one class of soils, and that the want of it produces the poverty of the other. Qualities that always thus accompany each other, cannot be otherwise than *cause and effect*. If further proof is wanting, it can be safely promised to be furnished when the practical application of calcareous manures to poor soils will be treated of, and their effects stated.

These deductions are then established as to all calcareous soils, and all poor soils—which descriptions comprise nine-tenths of all. This alone would open a wide field for the practical exercise of the truths we have reached. But still there remain strong objections and stubborn facts opposed to the complete proof of the proposition now under consideration, and consequently to the theory which that proposition is intended to support. The whole difficulty will be apparent at once when I now proceed to state that nearly all of our best soils, such as are very little if at all inferior in value to the small portion of shelly lands, are as destitute of calcareous earth as the poorest. So far as I have examined, this deficiency is no less general in the richest alluvial lands of the upper country—and, what will be deemed by some as incredible, by far the greater part of the rich limestone soils between the Blue Ridge and Alleghany Mountains are equally destitute of calcareous earth. These facts were not named before, to avoid embarrassing the

discussion of other points—nor can they now be explained, and reconciled with my proposition, except through a circuitous and apparently digressive course of reasoning. They have not been kept out of view, nor slurred over, to weaken their force, and are now presented in all their strength. These difficulties will be considered, and removed, in the following chapters.

CHAPTER VI.

CHEMICAL EXAMINATION OF RICH SOILS CONTAINING NO CALCARIOUS EARTH.

PROPOSITION 2. *Continued.*

Under common circumstances, when any disputant admits facts that seem to contradict his own reasoning, such admission is deemed abundant evidence of their existence. But though now placed exactly in this situation, the facts admitted by me are so opposed to all that scientific agriculturists have taught us to expect, that it is necessary for me to show the grounds on which my admission rests. Few would have believed in the absence of calcareous earth in all our poor soils—and far more strange is it that the same deficiency should extend to such rich soils as some that will be cited.

The following specimens, taken from well known and very fertile soils, were found to contain no calcareous earth. Many trials of other rich soils have yielded like results—and indeed, I have never found calcareous earth in any soil below the falls of the rivers, in which, or near which, some particles of shells were not visible.

1. Soil from Eppes' Island, which lies in James River, near City Point; light and friable (but not silicious) brown loam, rich and durable. The surface is not many feet above the highest tides, and like most of the best river lands, this tract seems to have been formed by alluvion many ages ago, but which may be termed recent, when compared to the general formation of the tide-water district.

2. Black silicious loam from the celebrated lands on Back River, near Hampton.

3. Soil from rich land on Pocason River, York County.

4. Black clay vegetable soil, from a fresh-water tide marsh on James River—formed by the most recent alluvion.

5. Alluvial soil of first rate fertility above the falls of James River—dark brown clay loam, from the valuable and extensive body of bottom land belonging to General J. H. Cocke, of Fluvanna.

The most remarkable facts of the absence of calcareous earth, are to be found in the limestone soils, between the Blue Ridge and Alleghany Mountains. Of these, I will report all that I have examined, and none contained any calcareous earth, unless when the contrary will be stated.*

* Before the first of these trials was made, I supposed (as probably most other persons do,) that *limestone soil* was necessarily *calcareous*, and in a high degree. It is difficult to get rid of this impression entirely—and it may seem a contradiction in terms to say that a *limestone soil* is not calcareous. This I cannot avoid: I must take the term *limestone soil* as cus.

1 to 6. Limestone soils selected in the neighborhood of Lexington, Virginia, by Professor Graham, with the view of enabling me to investigate this subject. All the specimens were from first rate soils, except one, which was from land of inferior value. One of the specimens, Mr. Graham's description stated to be "taken from a piece of land so rocky [with limestone] as to be unfit for cultivation—at least with the plough. I could scarcely select a specimen which I would expect to be more strongly impregnated with calcareous earth." This specimen, by two separate trials, yielded only one grain of calcareous earth, from one thousand of soil. The other six soils contained none. The same result was obtained from

7. A specimen of alluvial land on North River, near Lexington.

8. Brown loam from the Sweet Spring Valley, remarkable for its extraordinary productiveness and durability. It is of alluvial formation, and before it was drained, must have been often covered and saturated by the Sweet Spring and other mineral waters, which hold lime in solution. The surrounding highland is of limestone soil. Of this specimen, taken from about two hundred yards below the Sweet Spring, from land long cultivated every year, three hundred and sixty grains yielded not a particle of calcareous earth. It contained an unusually large proportion of oxide of iron, though my imperfect means enabled me to separate and collect only eight grains, the process evidently wasting several more.

About a mile lower down, drains were then making (in 1826) to reclaim more of this rich valley from the overflowing waters. Another specimen was taken from the bottom of a ditch just opened, eighteen inches below the surface. It was a black loam, and exhibited to the eye some very diminutive fresh-water shells, (periwinkles, about one-tenth of an inch in length,) and many of their broken fragments. This gave, from two hundred grains, seventy-four of calcareous earth. But this cannot fairly be placed on the same footing with the other soils, as it had obviously been once the bottom of a stream, or lake, and the collection and deposit of so large and unusual a proportion of calcareous matter, seemed to be of animal formation. Both these specimens were selected at my request by one of our best farmers, and who also furnished a written description of the soils, and their situation.

9. Woodland, west of Union, Monroe County. Soil, a black clay loam, lying on, but not intermixed at the surface with limestone rock. Subsoil, yellowish clay. The rock at this place, a foot below the surface. Principal growth, sugar maple, white walnut, and oak. This and the next specimen are from one of the richest tracts of highland that I have seen.

10. Soil similar to the last and about two hundred yards distant. Here the limestone showed above the surface, and the specimen was taken from between two large masses of fixed rock, and about a foot distant from each.

11. Black rich soil, from woodland between the Hot and Warm Springs, in Bath County. The

specimen was part of what was in contact with a mass of limestone.

12. Soil from the western foot of the Warm Spring Mountain, on a gentle slope between the court house and the road, and about one hundred and fifty yards from the Warm Bath. Rich brown loam, containing many small pieces of limestone, but no finely divided calcareous earth.

13. A specimen taken two or three hundred yards from the last, and also at the foot of the mountain. Soil, a rich black loam, full of small fragments of limestone of different sizes, between that of a nutmeg and small shot. The land had never been broken up for cultivation. One thousand grains contained two hundred and forty grains of small stone or gravel, mostly limestone, separated mechanically, and sixty-nine grains of finely divided calcareous earth.

14. Black loamy clay, from the excellent wheat soil adjoining the town of Bedford in Pennsylvania: the specimen taken from beneath and in contact with limestone. One thousand grains yielded less than one grain of calcareous earth.

15. A specimen from within a few yards of the last, but not in contact with limestone, contained no calcareous earth: neither did the red clay subsoil, six inches below the surface.

16. Very similar soil, but much deeper, adjoining the principal street of Bedford—the specimen taken from eighteen inches below the surface, and adjoining a mass of limestone. A very small disengagement of gas indicated the presence of calcareous earth—but certainly less than one grain in one thousand, and perhaps not half that quantity.

17. Alluvial soil on the Juniata, adjoining Bedford.

18. Alluvial vegetable soil near the stream flowing from all the Saratoga Mineral Springs, and necessarily often covered and soaked by those waters, and

19. Soil taken from the bed of the same stream—neither contained any portion of carbonate of lime.

Thus it appears, that of nineteen specimens of soils, only four contained calcareous earth, and three of these four, in exceedingly small proportions. It should be remarked that all these were selected from situations, which from their proximity to calcareous rock, or exposure to calcareous waters, were supposed most likely to present highly calcareous soils. If five hundred specimens had been taken without choice, from what are commonly limestone soils, (merely because they are not very distant from limestone rock, or springs of limestone water,) the analysis of that whole number would be less likely to show calcareous earth, than the foregoing short list. I therefore feel justified, from my own few examinations, and unsupported by any other authority, to pronounce that calcareous earth will very rarely be found in any soils between the falls of our rivers, and the navigable western waters. In a few specimens of some of the best soils from the borders of the Mississippi and its tributary rivers, I found calcareous earth present in all—but in small proportions, and in no case exceeding two per cent.

The only soils of considerable extent of surface which, from the specimens that I have examined, appear to be highly calcareous, and to agree in that respect, with many European soils, are from

tom has already fixed it. But it should not be extended to any soils except those which are so near to limestone rock, as in some measure to be thereby affected in their qualities and value.

the *prairies*, those lands of the west which, whether rich or poor, are remarkable for being destitute of trees, and covered with grass, so as to form natural meadows. The examinations were made but recently, (in 1834) and are reported because presenting striking exceptions to the general constitution of soils in this country.

20. *Prairie soil* of the most productive kind in Alabama, is a black clay, with very little sand, yet so far from being stiff, that it becomes too light by cultivation. This kind of land is stated by the friend to whom I am indebted for the specimens, to "produce corn and oats most luxuriantly—and also cotton for two or three years; but after that time cotton is subject to the rust, probably from the then open state of the soil, which by cultivation has by that time become as light and as soft as a bank of ashes." One hundred grains of the specimen contained eight of carbonate of lime. All this prairie land in Alabama lies on a substratum of what is there called "rotten limestone," (specimens of which contained seventy-two to eighty-two per cent. of lime,) and which rises to the surface sometimes, forming the "bald prairies," a sample of the soil of which (21) contained fifty-nine per cent. of carbonate of lime. This was described as "comparatively poor—neither trees nor bushes grow there, and only grass and weeds before cultivation—corn does not grow well—small grain better—and cotton soon becomes subject to the rust." The excessive proportion of calcareous earth is evidently the cause of its barrenness.

The substratum called limestone is soft enough to be cut easily and smoothly with a knife, and some of it is in appearance and texture more like the chalk of Europe, than any other earth that I have seen in this country.

22. A specimen of the very rich "cane brake" lands in Marengo County, Alabama, contained sixteen per cent. of carbonate of lime. This is a kind of prairie, of a wetter nature, from the winter rains not being able to run off from the level surface, nor to sink through the tenacious clay soil, and the solid stratum of limestone below.

23. A specimen from the very extensive "Choctaw Prairie" in Mississippi, of celebrated fertility, yielded thirteen per cent. of carbonate of lime.

Several other specimens of different, but all of very fertile soils from Southern Alabama, and all lying over the substratum of soft limestone, were found to be *neutral*, containing not a particle of lime in the form of *carbonate*. These specimens were as follows:—

24. One from the valley cane land—"very wet through the winter, but always dry in summer—and after being ditched, is dry enough to be cultivated in cotton, which will grow from eight to twelve feet high."

25. Another from what is called the best "post-oak land," on which trees of that kind grow to the size of from two to four feet in diameter—having but little underwood, and no cane growth—"thought to be nearly as rich as the best cane land, and will produce 1500 lbs. or more, of seed cotton, or fifty bushels of corn to the acre."

26. Another from what is termed "palmetto land, having on it that plant as well as a heavy cover of large trees growing luxuriantly. It is a cold and wet soil before being brought into good tilth; but afterwards is soft and easy to till, and produces corn and cotton finely. The cane on it is

generally small: the soil from four to ten feet deep."*

The foregoing details, respecting limestone lands, may perhaps be considered an unnecessary digression, in a treatise on the soils of the tide-water district. But the analysis of limestone soils furnishes the strongest evidence of the remarkable and novel fact of the general absence of calcareous earth—and the information thence derived, will be used to sustain the following steps of my argument.

All the examinations of soils in this chapter concur in opposing the general application of the proposition that the deficiency of calcareous earth is the cause of the sterility of our soils: and having stated the objection in all its force, I shall now proceed to inquire into its causes, and endeavor to dispel its apparent opposition to my doctrine.

CHAPTER VII.

PROOFS OF THE EXISTENCE OF ACID AND NEUTRAL SOILS.

PROPOSITION 2. *Continued.*

Sufficient evidence has been adduced to prove that many of our most fertile and valuable soils are destitute of calcareous earth: but it does not necessarily follow that such has always been their composition—or that they may not now contain lime combined with some other acid than the carbonic. That this is really the case, I shall now offer proofs to establish—and not only maintain this position with regard to those valuable soils, but shall contend that lime in some proportion, combined with *vegetable acid*, is present in every soil capable of supporting vegetation.

But while I shall endeavor to maintain these positions, without asking or admitting any exception, let me not be understood as asserting that the original ingredient of calcareous earth was always the sole cause of the fertility of any particular soil, or that a knowledge of the proportion contained, would serve to measure the capacity of the soil for improvement. Calcareous soils not differing materially in qualities or value, often exhibit a remarkable difference in their respective proportions of calcareous earth: so that it would seem, that a small quantity, aided by some other unknown agent, may give as much capacity for improvement, and ultimately produce as much fer-

* It is proper to mention a circumstance which may have had some effect in removing the carbonate of lime from these Alabama soils, besides the more general causes which will be traced in the next chapter. With these specimens of soil, was sent a collection of the small stones and gravel which were stated to be found generally through these soils, and particularly in the clay subsoil beneath. Among these there were several fragments of *sulphuret of iron*. This mineral when decomposing in the earth in contact with carbonate of lime, also decomposes the latter substance, and forms sulphate of lime, [gypsum,] instead. It is well worth inquiry whether sulphuret of iron is generally found in these soils. It may be known by its great weight, and metallic lustre when broken, (which has caused it often to be mistaken for silver ore,) and by giving out fumes of burning sulphur when subjected to strong heat under a blow pipe.

tility, as ten times that proportion, under other circumstances.

In all naturally poor soils, producing freely, in their virgin state, pine and whortleberry, and sorrel after cultivation, I suppose to have been formed some *vegetable acid*, which, after taking up whatever small quantity of lime might have been present, still remains in excess in the soil, and nourishes in the highest degree the plants named above, but is a poison to all useful crops; and effectually prevents such soils becoming rich, from either natural or artificial applications of putrescent manures.

In a *neutral soil*, I suppose calcareous earth to have been sufficiently abundant to produce a high degree of fertility—but that it has been decomposed, and the lime taken up, by the gradual formation of vegetable acid, until the lime and the acid neutralize and balance each other, leaving no considerable excess of either. Such are all our fertile soils that are not calcareous.

These suppositions remain to be proved, in all their parts.

No opinion has been yet advanced that is less supported by good authority, or to which more general opposition may be expected, than that which supposes the existence of acid soils. The term *sour soil* is frequently used by farmers, but in so loose a manner as to deserve no consideration: it has been thus applied to any cold and ungrateful land, without intending that the term should be literally understood, and perhaps without attaching to its use any precise meaning whatever. Dundonald only, of all those who have applied chemistry to agriculture, has asserted the existence of vegetable acid in soils;* but he has offered no analysis, nor any other evidence to establish the fact—and his opinion has received no confirmation, nor even the slightest notice, from later and more able investigators of the chemical characters of soils. Kirwan and Davy profess to enumerate all the common ingredients of soils, and it is not intimated by either, that vegetable acid is one of them. Even this tacit denial by Davy, more strongly opposes the existence of vegetable acid, than it is supported by the opinion of Dundonald, or any of those writers on agriculture who have admitted its existence. Grisenthwaite, a late writer on agricultural chemistry, and who has the advantage of knowing the discoveries, and comparing the opinions of all his predecessors, expressly denies the possibility of any acid existing in soils. His *New Theory of Agriculture* contains the following passage: "Chalk has been recommended as a substance calculated to correct the sourness of land. It would surely have been a wise practice to have previously ascertained this existence of acid, and to have determined its nature, in order that it might be effectually removed. The fact really is, that no soil was ever yet found to contain any notable quantity of acid. The acetic and the carbonic are the only two that are likely to be generated by any spontaneous decomposition of animal or vegetable bodies, and neither of them have any fixity when exposed to the air." Thus, then, my doctrine is deprived of even the feeble support it might have had from Dundonald's mere opinion, if that opin-

ion had not been contradicted by later and better authority: and the only support that I can look for, will be in the facts and arguments that I shall be able to adduce.

I am not prepared to question what Grisenthwaite states as a chemical fact, "that no soil was ever yet found to contain any notable quantity of acid." No soil examined by me for this purpose, gave any evidence of the presence of uncombined acid. Still, however, the term acid may be applied with propriety to soils, in which growing vegetables continually receive acid from the decomposition of others, (for which no "fixity" is requisite,) or in which acid is present, not free, but combined with some base, by which it is readily yielded to promote, or retard, the growth of plants in contact with it. It will be sufficient for my purpose to show that certain soils contain some substance, or possess some quality, which promotes almost exclusively the growth of acid plants—that this power is strengthened by adding known vegetable acids to the soil—and is totally removed by the application of calcareous manures, which would necessarily destroy any acid, if it were present. Leaving it to chemists to determine the nature and properties of this substance, I merely contend for its existence and effects: and the cause of these effects, whatever it may be, for the want of a better name, I shall call *acidity*.

The proofs now to be offered in support of the existence of acid and neutral soils, however weak each may be when considered alone, yet when taken in connexion, will together form a body of evidence not easily to be resisted.

1st Proof. Pine and common sorrel have leaves well known to be acid to the taste; and their growth is favored by the soils which I suppose to be acid, to an extent which would be thought remarkable in other plants on the richest soils. Except wild locust on the best river land, no growth can compare in rapidity with pines on soils naturally poor, and even greatly reduced by long cultivation. Pines usually stand so thick on old exhausted fields, that the increase of size in each plant is greatly retarded—but if the whole growth of an acre is estimated, it would probably exceed in quantity the different growth of the richest soils, of the same age and on an equal space. Every cultivator of corn on poor light soil knows how rapidly sorrel* will cover his otherwise naked field, unless kept in check by continual tillage—and that to root it out, so as to prevent the like future labor, cannot be effected by any mode of cultivation whatever. This weed too is considered far more hurtful to growing crops, than any other of equal size. Yet neither of these acid plants can thrive on the best lands. Sorrel cannot even live on a calcareous soil—and if a pine is sometimes found there, it has nothing of its usual elegant form, but seems as stunted and ill shaped as if it had always suffered for want of nourishment. Innumerable facts, of which these are examples, prove that these acid plants must derive from their

* Sheep sorrel, or *Rumex acetosa*. The wood sorrel (*oxalis acetocella*) is of a very different character. This prefers rich and calcareous soils, and I have seen it growing on places calcareous to excess. It would seem, therefore, that wood sorrel forms its acid from the atmosphere, and does not draw it from the soil, as is evidently the case with common sorrel.

*Dundonald's Connexion of Chemistry and Agriculture.

favorite soil some kind of food peculiarly suited to their growth, and quite useless, if not hurtful, to cultivated crops.

2. Dead acid plants are the most effectual in promoting the growth of living ones. When pine leaves are applied to a soil, whatever acid they contain is of course given to that soil, for such time as circumstances permit it to retain its form, or peculiar properties. Such an application is often made on a large scale, by cutting down the second growth of pines, on land once under tillage, and suffering them to lie a year before clearing and cultivating the land. The invariable consequence of this course, is a growth of sorrel for one or two crops, so abundant and so injurious to the crops, as to more than balance any benefit derived by the soil, from the vegetable matter having been allowed to rot. From the general experience of this effect, most persons put pine land under tillage as soon as cut down, after carefully burning the whole of the heavy cover of leaves, both green and dry. Until within a few years, it was generally supposed that the leaves of pine were worthless, if not hurtful, in all applications to cultivated land—which opinion doubtless was founded on such facts as have been just stated. But if they are used as litter for cattle, and heaped to ferment, the injurious quality of pine leaves is destroyed, and they become a valuable manure. This practice is but of recent origin—but is highly approved, and rapidly extending.

On one of the washed and barren declivities (or *galls*) which are so numerous on all our farms, I had the small gullies packed full of green pine bushes, and then covered with the earth drawn from the equally barren intervening ridges, so as nearly to smooth the whole surface. The whole piece had borne nothing previously except a few scattered tufts of poverty grass, and dwarfish sorrel, all of which did not prevent the spot seeming quite bare at midsummer, if viewed at the distance of one hundred yards. This operation was performed in February or March. The land was not cultivated, nor again observed until the second summer afterwards. At that time, the piece remained as bare as formerly, except along the filled gullies, which throughout the whole of their crooked courses, were covered by a thick and tall growth of sorrel, remarkably luxuriant for any situation, and which being bounded exactly by the width of the narrow gullies, had the appearance of some vegetable sown thickly in drills, and kept clean by tillage. So great an effect of this kind has not been produced within my knowledge—though facts of like nature and leading to the same conclusion, are of frequent occurrence. If small pines standing thinly over a broom-grass old field, are cut down and left to lie, under every top will be found a patch of sorrel, before the leaves have all rotted.

3. The growth of sorrel is not only peculiarly favored by the application of vegetables containing acids already formed, but also by such matters as will form acid in the course of their decomposition. Farm-yard manure, and all other putrescent animal and vegetable substances, form *acetic acid* as their decomposition proceeds.* If heaps of rotting manure are left without being spread, in a field the least subject to produce sorrel, a few

weeks of growing weather will bring out that plant close around every heap—and for some time, it will continue to show more benefit from that rank manuring than any other grass. For several years my winter-made manure was spread and ploughed in on land not cultivated until the next autumn, or the spring after. This practice was founded on the mistaken opinion, that it would prevent much of the usual exposure to evaporation and waste of the manure. One of the reasons which alone would have compelled me to abandon this absurd practice, was, that a crop of sorrel always followed, (even on good soils that before barely permitted a scanty growth to live,) which so injured the next grain crop as greatly to lessen the benefit from the manure. Sorrel unnaturally produced by such applications, does not infest the land longer than until we may suppose the acid to have been removed by cultivation, and other causes.

It may be objected that my authorities prove only the formation of a single vegetable acid in soil, the acetic—that my facts show only the production of a single acid plant, sorrel—and that the acid which sorrel contains is not the acetic, but the oxalic.* From the application of acids to recently ploughed land, no acid plant except sorrel is made to grow, because that only can spring up speedily enough to arrest the fleeting nutriment. Poverty grass grows only on the same kinds of soil, and generally covers them after they have been a year free from a crop, but does not show sooner—and pines require two years before their seeds will produce plants. But when pines begin to spread over the land, they soon put an end to the growth of all other plants, and are abundantly supplied with their acid food, from the dropping of their own leaves. Thus they may be first supplied with the vegetable acid ready formed in the leaves, and afterwards with the acetic acid, formed by their subsequent slow decomposition. It does not weaken my argument, that the product of a plant is a vegetable acid different from the one supposed to have nourished its growth. All vegetable acids (except the prussic) however different in their properties, are composed of the same three elementary bodies, differing only in their proportions†—and consequently are all convertible into each other. A little more, or a little less of one or the other of these ingredients, may change the acetic to the oxalic acid, and that to any other. We cannot doubt but that such simple changes may be produced by the chemical powers of vegetation, when others are effected, far more difficult for us to comprehend. The most tender and feeble organs, and the mildest juices, aided by the power of animal or vegetable life, are able to produce decompositions and combinations, which the chemist cannot explain, and which he would in vain attempt to imitate.

4. This ingredient of soils which nourishes acid plants, also poisons cultivated crops. Plants have not the power of rejecting noxious fluids, but take up by their roots every thing presented in a soluble form.‡ Thus the acid also enters the sap-vessels of cultivated plants, stunts their growth, and makes

* Agr. Chem. Lecture 3.

† Carbon, Oxygen and Hydrogen. Agr. Chem. Lecture 3, p. 78.

‡ Agr. Chem. Lecture 6, page 186.

* Agr. Chem. p. 187.

impossible for them to attain that size and perfection, which their proper food would ensure, if it was presented to them without its poisonous accompaniment. When the poorest virgin woodland is cut down, it is covered and filled to excess with leaves and other rotted and rotting vegetable matters. Can a heavier vegetable manuring be desired? And as it completely rots during cultivation, must not it offer to the growing plants as abundant a supply of food as they can require?—Yet the best product obtained may be from ten to fifteen bushels of corn, or five or six of wheat, soon to come down to half those quantities. If the noxious quality which causes such injury is an acid, it is as certain as any chemical truth whatever, that it will be neutralized, and its powers destroyed, by applying enough of calcareous earth to the soil: and precisely such effects are found whenever that remedy is tried. On land thus relieved of this unceasing annoyance, the young corn no longer appears of a pale and sickly green, approaching to yellow, but takes immediately a deep healthy color, by which it may readily be distinguished from any on soil left in its former state, before there is any perceptible difference in the size of the plants. The crop will produce fifty to one hundred per cent. more, the first year, before its supply of food can possibly have been increased—and the soil is soon found not only cleared of sorrel, but incapable of producing it. I have anticipated these effects of calcareous manures, before furnishing the proof—but they will hereafter be established beyond contradiction.

The truth of the existence of either acid, or neutral soils, depends on the existence of the other—and to prove either, will necessarily establish both. If acid exists in soils, then wherever it meets with calcareous earth, the two substances must combine and neutralize each other, so far as their proportions are properly adjusted. On the other hand, if I can show that compounds of lime and vegetable acid are present in most soils, it follows inevitably that nature has provided means by which soils can generally obtain this acid: and if the amount formed can balance the lime, the operation of the same causes can exceed that quantity, and leave an excess of free acid. From these premises will be deduced the following proofs.

5. It has been stated (page 18) that the process recommended by chemists for finding the calcareous earth in soils was unfit for that purpose, because a *precipitate* was always obtained even when no calcareous earth, or carbonate of lime was present. Frequent trials have shown me that this precipitate is considerably more abundant from good soils than bad. The substance thus obtained from rich soils by solution and precipitation, in every case that I have tried, contains some calcareous earth, although the soil from which it was derived had none. The alkaline liquor from which the precipitate has been separated, we are told by Davy will, after boiling, let fall the carbonate of magnesia, if any had been in the soil: but when any notable deposit is thus obtained, it will often be found to consist more of carbonate of lime, than of magnesia. The following are examples of such products:

One thousand grains of tide marsh soil (described page 20) acted on by muriatic acid in the pneumatic apparatus, gave out no carbonic acid

gas, and therefore could have contained no carbonate of lime. The precipitate obtained from the same weighed sixteen grains—which being again acted on by sulphuric acid, evolved as much gas as showed that three grains had become carbonate of lime, in the previous part of the process.

Two hundred grains of alluvial soil from Saratoga Springs (page 21, No. 18,) containing no carbonate of lime, yielded a precipitate of twelve grains, of which three was carbonate of lime—and a deposit from the alkaline solution weighing six grains, four of which was carbonate of lime.

Seven hundred grains of limestone soil from Bedford (part of the specimen marked 14, page 21,) contained about two-thirds of a grain of carbonate of lime—and its precipitate of twenty-eight grains, only yielded two grains: but the alkaline solution deposited eleven grains of the carbonates of lime and magnesia, of which at least five was of the former, as there remained seven and a half of solid matter, after the action of sulphuric acid.*

From this process, there can be no doubt but that the soil contained a proportion of some *salt of lime* (or lime combined with some kind of acid) which being decomposed by and combined with the muriatic acid, was then precipitated, not in its first form, but in that of carbonate of lime—it being supplied with carbonic acid from the carbonate of potash, used to produce the precipitation. The proportions obtained in these cases were small; but it does not follow that the whole quantity of lime contained in the soil was found. However, to the extent of this small proportion of lime is proved clearly the presence of enough of some acid (and that not the carbonic) to combine with it. Neither could it have been the sulphuric, or the phosphoric acid: for though both the sulphate and phosphate of lime are in some soils, yet neither of these salts can be decomposed by muriatic acid.

6. The strongest objection to the doctrine of neutral soils is, that if true, the salt formed by the combination of the lime and acid must often be present in such large proportions, that it is scarcely credible that its presence and nature should not have been discovered by any of the chemists who have analyzed soils. This difficulty I cannot remove: but it may be met (or neutralized—to borrow a figure from my subject,) by showing that an equal difficulty awaits those who may support the other side of the argument.

* The measurement of the carbonic acid gas evolved, was relied on to show the whole amount of carbonates present—and sulphuric acid was used to distinguish between lime and magnesia, in the deposit from the alkaline solution. If any alumina or magnesia had made part of the solid matter exposed to diluted sulphuric acid, the combinations formed would have been soluble salts, which would of course have remained dissolved and invisible in the fluid. Lime only of the four earths forms with sulphuric acid a substance but slightly soluble, and which therefore can be mostly separated in a solid form. The whole of this substance (sulphate of lime) cannot be obtained in this manner, as a part is always dissolved: but whatever is obtained, proves that at least two-thirds of that quantity of carbonate of lime had been present: as that quantity of lime which will combine with enough carbonic acid to make 100 parts (by weight) of carbonate of lime, will combine with so much more of sulphuric acid, as to form about 150 parts of the sulphate of lime, or gypsum.

The theory of geologists of the formation of soils from the decomposition, or disintegration of rocks, is received as true by scientific agriculturists. The soils thus supposed to be formed, receive admixtures from each other, by means of different operations of nature, and after being more or less enriched by the decay of their own vegetable products, make the endless variety of existing soils.* But where a soil lying on, and thus supposed to have been formed from any particular kind of rock, is so situated that it could not have been moved, or received considerable accessions from torrents, or other causes, then, according to this theory, the rock and the soil should be composed of the same materials—and such soils as the specimens marked 11 and 16 (page 21) would be, like the rock they touched, nearly pure calcareous earth, instead of being (as they were in truth) destitute, or nearly so, of that ingredient. Such are the doctrines received and taught by Davy, or the unavoidable deductions from them. But without contending for the full extent of this theory of the formation of soils, (because I consider it almost entirely false,) every one must admit that soils thus situated, must have received in the lapse of ages, some accessions to their bulk, from the effects of frost, rain, sun, and air, on the limestone in contact with them. All limestone soils, properly so called, exhibit certain marked and peculiar characters of color, texture, and products, which can only be derived from receiving into their composition more or less of the rock which lies beneath, or rises above their surface. This mixture will not be denied by any one who has observed limestone soils, and reasons fairly, whether his investigation begins with the causes, or their effects. If then all this gain of calcareous earth remains in the soil, why is none, or almost none, discovered by accurate chemical analysis? Or, if it be supposed not present, nor yet changed in its chemical character, in what possible manner could a ponderous and insoluble earth have made its escape from the soil? To remove this obstacle without admitting the operation of acid in making such soils neutral, will be attended with at least as much difficulty, as any arising from that admission being made.

7. But we are not left entirely to conjecture that soils were once more calcareous than they now are, if chemical tests can be relied on to furnish proof. Acid soils that have received large quantities of calcareous earth as manure, after some time, will yield very little when analyzed. To a soil of this kind, full of vegetable matter, I applied, in 1818 and 1831, fossil shells at such a known and heavy rate as would have given to the soil (by calculation) at least three per cent. of calcareous earth, for the depth of five inches. Only a small portion of the shelly matter was very finely divided when applied. Since the application of the greater part of this dressing, (only one-fourth having been laid on in 1818,) no more than six years had passed before the following examinations were made—and the cultivation of five crops in that time, three of which were horse-hoed, must have well mixed the calcareous earth with the soil.

* Agr. Chem. p. 181. Also Treatise on Agriculture (by General Armstrong) in vol. I. of American Farmer, quoted in Appendix D.

Three careful examinations gave the following results.

No. 1.—1000 grains yielded $7\frac{1}{2}$ of coarse calcareous earth, (fragments of shells.)
And less than $\frac{1}{2}$ of finely divided.

8

No. 2.—1000 grains yielded 5 of coarse,
2 finely divided.

7

No. 3.—1500 grains yielded 15 of coarse,
 $2\frac{1}{2}$ finely divided.

17 $\frac{1}{2}$

The specimens No. 1 and No. 2 were obtained by taking handfuls of soil from several places, (four in one case, and twelve in the other) mixing them well together, and then taking the samples for trial from the two parcels. On such land, when not recently ploughed, there will always be an over proportion of the pieces of shells on the surface, as the rains have settled the fine soil, and left exposed the coarse matters. On this account, in making these two selections, the upper half inch was first thrown aside, and the handful dug from below. No. 3 was taken from a spot showing a full average thickness of shells, and included the surface. I considered the three trials made as fairly as possible, to give a general average. Small as is the proportion of finely divided calcareous earth exhibited, it must have been increased by rubbing some particles from the coarse fragments, in the operation of separating them by a fine sieve. Indeed it may be doubted whether any proportion remained very finely divided—or in other words, whether it was not combined with acid, as fast as it was so reduced. But without the benefit of this supposition, the finely divided calcareous earth in the three specimens, averaged only one and one-fourth grains to the thousand, which is one twenty-fourth of the quantity laid on: and the total quantity obtained, of coarse and fine, is eight grains in one thousand, or about one-fourth of the original proportion. All the balance had changed its form, or otherwise disappeared, in the few years that had passed since the application.

The very small proportions of finely divided calcareous earth compared to the coarse, in some shelly soils, furnish still stronger evidence of this kind. Of the York River soil, (described page 19, No. 5.)

1260 grains, yielded of coarse calca-
reous parts, - - - 168 grains.
And of finely divided, - - - 8

1044 of the rich Nansemond soil,
(No. 6,) - - - 544 coarse.
18 fine.

As many of the shells* and their fragments in these soils are in a mouldering state, it is incredible that the whole quantity of finely divided particles derived from them should have amounted to no more than these small proportions. Independent of the action of natural causes, the plough

alone, in a few years, must have pulverized at least as much of the shells, as was found.

8. In other cases, where the operations of nature have been applying calcareous earth, for ages, none now remains in the soil; and the proof thence derived is more striking, than any obtained from artificial applications, of only a few years standing. Valleys subject to be frequently overflowed and saturated by the water of limestone streams, must necessarily retain a new supply of calcareous earth from every such soaking and drying.

Limestone water contains the *super-carbonate of lime*, which is soluble: but this loses its excess of carbonic acid when left dry by evaporation, and becomes the carbonate of lime, which not being soluble, is in no danger of being removed by subsequent floods. Thus accessions are slowly but continually made, through many centuries. Yet such soils are found containing no calcareous earth

—of which a remarkable example is presented in the soil of the cultivated part of the Sweet Spring Valley, (No. 8, page 21.)*

9. All *wood ashes* contain salts of lime, (and most kinds in large proportions,) which could have been derived from no other source than the soil on which the trees grew. The lime thus obtained is principally combined with carbonic acid, and partly with the phosphoric, forming phosphate of lime. The table of Saussure's analyses of the ashes of numerous plants,† is sufficient to show that these products are general, if not universal. The following examples of some of my own examinations, prove that ashes yield calcareous earth in proportions suitable to their kind, although the wood grew on soils destitute of that ingredient—as was ascertained with regard to each of these soils.

100 grains of ashes from.	What soil taken from.	Carbonate of Lime.	Phosphate of Lime.
Whortleberry bushes, the entire plants, except the leaves,	Acid silicious loam,	4 grains.	4 grains.
Equal parts of the bark, heart, and sapwood, of an old locust,	The same,	51	18
Young locust bushes entire,	Rich neutral clay loam,	40	30
Young pine bushes,	Acid silicious loam,	9	6
Body of a young pine tree.	Acid clay soil.	14	18

The potash was first carefully taken out of all these samples. The remaining solid matter was silicious sand, and charcoal: the proportion of the latter varying according to the degree of heat used in burning the wood, which was not permitted to be very strong, for fear of converting the calcareous earth into quick-lime.

All the carbonate of lime yielded by ashes, was necessarily furnished in some form by the soil on which the plants grew—and when the soil itself contained no carbonate, some other compound of lime must have been present, to enable us to account for these certain and invariable results. The presence of a combination of lime with some *vegetable acid*, and none other, would serve to produce such effects. According to established chemical laws, if any such combination had been taken up into the sap-vessels of the tree, it would be decomposed by the heat necessary to convert the wood to ashes; the acid would be reduced to its elementary principles, and the lime would immediately unite with the carbonic acid, (which is produced abundantly by the process of combustion,) and thus present a product of *carbonate of lime* newly formed from the materials of the other substances decomposed.‡

On the foregoing facts and deductions, I am content to rest the truth of the existence of acid and neutral soils.

I have chosen to leave all the preceding part of this chapter (with the exception of a few merely verbal corrections and alterations) precisely as it appeared in the first edition of this essay, (January 1832.) But since that time I have first heard of a discovery, and of consequent investigations by men of science, which seem to furnish direct proof of what I have been contending for, viz: *the existence of a vegetable acid substance in soils and manures, generally diffused, and often in large proportions, and yet which had not been known or suspected by chemists previously.* The first intimation of this discovery which reached me was in the *Alphabet of Scientific Gardening*, by Professor Rennie, published in London in 1833, from which the part relative to this subject will be quoted below. Since then I have been enabled to consult the late French work of Berzelius, in which his views of humic acid are given more at length, and from which an extract will be translated and given in the appendix. [See F.] The facts respecting humic acid, as concisely stated in the follow-

* The excess of carbonic acid which unites with lime and renders the compound soluble in water, is lost by exposure of the calcareous water to the air, as well as by evaporation to dryness. [Accum's Chemistry—Lime.] The masses of soft calcareous rock which are deposited in the rapids of limestone streams, are examples of the loss of carbonic acid from exposure to the air; and the stalactites in caves, the deposit of the slow-dropping water holding in solution the super carbonate of lime, are examples of the same effect produced by evaporation. A similar deposit of insoluble carbonate of lime, from both these causes, is necessarily made on all land subject to be overflowed by limestone waters.

† Quoted in Agr. Chem. Lecture 3.

‡ The reasoning on the presence of the carbonate of lime found in ashes from acid soils, does not apply to the phosphate of lime which is always also present. The latter salt is not decomposed by any known degree of heat, [Art. Chemistry, in Edin. Ency.] and therefore might have remained unchanged, in passing from the soil to the tree, and thence to the ashes.

ing quotation from Professor Rennie, furnish strong confirmation of some of the opinions which I have endeavored to maintain. It will however be left, without farther comment, for the reader to observe the accordance, and to make the application.

"HUMIC ACID AND HUMIN.—In most chemical books the terms *Ulmic Acid* and *Ulm* are used, from *Ulmus*, elm; but, as its substance occurs in most, if not all plants, the name is bad. I prefer Sprengel's terms, from *Humus*, soil.

This important substance was first discovered by Klaproth, in a sort of gum from an elm; but it has since been found by Berzelius in all barks; by M. Braconnot in saw-dust, starch, and sugar; and what is still more interesting for our present purpose, it has been found by Sprengel and M. Polydore Boullay, to constitute a leading principle in soils and manures. *Humin* appears to be formed of carbon and hydrogen, and the *humic acid* of humin and oxygen. Pure humin is of a deep blackish brown, without taste or smell, and water dissolves it with great difficulty and in small quantities; consequently it cannot, when pure, be available as food for plants.

Humic acid however, which I may remark, is *not sour to the taste*, readily combines with many of the substances found in soils and manures, and not only renders them, but itself also, easy to be dissolved in water, which in their separate state could not take place. In this way *humic acid will combine with lime, potass, and ammonia, in the form of humates, and the smallest portion of these will render it soluble in water and fit to be taken up by the spongelets of the root fibres.*

It appears to have been from ignorance of the important action of the humic acid in thus helping to dissolve earthy matters, that the older writers were so puzzled to discover how lime and potass got into plants; and it seems also to be this, chiefly, which is so vaguely treated of in the older books, under the names of *extractive*, *vegetable extract*, *mucilaginous matter*, and the like. Saussure, for instance, filled a vessel with turf, and moistened it thoroughly with pure water, when by putting ten thousand parts of it by weight under a heavy press, and filtering and evaporating the fluid, he obtained twenty-six parts of what he termed *extract*; from ten thousand parts of well dunged and rich kitchen garden mould, he obtained ten parts of *extract*; and from ten thousand parts of good corn field mould, he obtained four parts of *extract*.

M. Polydore Boullay found that the liquid manure, drained from dung hills, contains a large proportion of humic acid, which accounts for its fertilizing properties so well known in China and on the continent: and he found it also in peat earth, and in varying proportions in all sorts of turf. It appears probable, from Gay-Lussac having found a similar acid, (technically *Azumic acid*,) on decomposing the prussic acid, (technically *Hydrocyanic acid*,) that the humic acid may be found in animal blood, and if so, it will account for its utility as a manure for vines, &c. Döbereiner found the gallic acid convertible into the humic."

But without the aid of this recent discovery of the humic acid, if the foregoing examinations of soils, and the arguments which follow remain unquestioned, these two remarkable and important facts may be considered as established:

1st. That calcareous earth, or carbonate of lime,

is in general as entirely deficient in the soils of Virginia, as that ingredient has heretofore been supposed by agricultural writers, to be common in all soils: and

2nd. That notwithstanding this total absence of the carbonate of lime, that lime in some other form of combination, in greater or less quantities, is an ingredient of every soil capable of producing vegetation.

Nor do these facts come in conflict with each other; nor either of them with the position which has been contended for, that calcareous matter in proper proportions is necessary to cause fertility in soils. Should some other person, who may be aided by sufficient scientific light, undertake the investigation, he may supply all that is wanting for the full proof of this theory of the cause of fertility, by showing that the value of a soil (under equal circumstances) is in proportion to the quantity of the vegetable salt of lime present in the soil. The direct and positive proof of this doctrine, I confidently anticipate will hereafter be obtained from more full examinations of the humic acid, and its compounds in various soils, and from correct and minute reports of the quantities and kinds of those ingredients, and of the rate of natural fertility of each soil. As yet, however interesting the recent discovery of humic acid may be to chemists, it does not seem that they have suspected it to have any thing like the important bearing on the fertilization of soil, which I had attributed to the supposed acid principle or ingredient.

Supposing the doctrine to be sufficiently proved, it may be useful to trace the formation of acidity in different soils, according to the views which have been presented, and to display the promise which that quality holds out for improving those soils, which it has hitherto rendered barren and worthless.

Every neutral soil at some former time contained calcareous earth in sufficient quantity to produce the uniform effect of that ingredient of storing up and fixing fertility. The decomposition of the successive growth of plants left to rot on the rich soil, continually formed vegetable acid, which slowly and gradually united with the lime in the soil. At last these two principles balanced each other, and the soil was no longer calcareous, but became neutral. Instead of its former ingredient carbonate of lime, it was now supplied with a *vegetable salt of lime*. This change of soil does not effect the natural growth, which remains the same, and thrives as well as when the soil was calcareous—and when brought into cultivation, the soil is equally productive under all crops suited to calcareous soils. If the supplies of vegetable matter continue, the soil may even become acid in some measure, as may be evidenced by the growth of sorrel—but without losing any of its fertility before acquired. The quantity of acidity in any soil frequently varies: it is increased by the growth of such plants as delight to feed on it, and by the decomposition of all vegetable matters. Hence the longer a poor field remains at rest, and not grazed, the more acid it becomes—and this evil keeping pace with the benefits derived, is the cause why so little improvement, or increased product, is obtained from putting acid soils under that mild treatment. Cultivation not only prevents new supplies, but also diminishes the acidity al-

ready present in excess, by exposing it to the atmosphere—and the more a soil is exhausted, the more will its acidity be lessened.

We have seen from the proof furnished by the analysis of wood ashes, that even poor acid soils contain a little salt of lime, and therefore must have been slightly calcareous at some former time. But such small proportions of calcareous earth were soon equalled, and then exceeded, by the formation of vegetable acid, before much productiveness was caused. The soil being thus changed, the plants suitable to calcareous soils died off, and gave place to others which produce, as well as feed and thrive on acidity. Still, however, even these plants furnish abundant supplies of vegetable matter, sufficient to enrich the land in the highest degree; but the antiseptic power of the acid prevents the leaves from rotting for years, and even then, the soil has no power to profit by them. Though continually wasted, the vegetable matter is always present in abundance; but must remain almost useless to the soil, until the accompanying acidity shall be destroyed.

It may well be doubted whether any soil destitute of lime in every form, would not soon become a perfect barren, incapable of producing a spire of grass. No soil thus destitute is known, as the plants of all soils show in their ashes the presence of some lime. But it is probable that our subsoils, which when left naked by the washing away of the soil, are so generally and totally barren, are made so by their being entirely destitute of lime in any form. There is a natural process regularly and at all times working to deprive the subsoil of all lime, unless the soil is abundantly supplied. What constitutes soil, and makes the strong and plain mark of separation and distinction between the more or less fertile soil and the absolutely sterile subsoil beneath? The most obvious cause for this difference which might be stated, is the dropping of the dead vegetable matter on the surface: but this is not sufficient alone to produce the effects, though it may be when aided by another cause of more power. When the most barren soil was formed or deposited by any of the natural agents to which such effects are attributed by geologists, it seems reasonable to suppose that the surface was no richer than any lower part. If then a very minute proportion of lime had been equally distributed through the body of poor soil to any depth that the roots of trees could penetrate, it would follow that the roots would in the course of time take up all the lime, as all would be wanting for the support of the trees: and their death and decay would afterwards leave all this former ingredient of the soil in general, on the surface. This process must have the effect, in the course of time, of fixing on and near the surface the whole of a scanty supply of lime, and on leaving the subsoil without any. But if there is within the reach of the roots more lime than any one crop or growth of plants need, then the superfluous lime will be permitted to remain in the subsoil, which will then be improvable by vegetable substances, and readily convertible to productive soil. The manner in which lime thus operates, will be explained in the next chapter.

Nearly all the woodland now remaining in Lower Virginia, and much of what has long been arable, is rendered unproductive by acidity, and successive generations have toiled on them with-

out remuneration, and without suspecting that their worst virgin land was then richer than their manured lots appeared to be. The cultivator of such soil, who knows not its peculiar disease, has no other prospect than a gradual decrease of his always scanty crops. But if the evil is once understood, and the means of its removal within his reach, he has reason to rejoice that his soil was so constituted as to be preserved from the effects of the improvidence of his forefathers, who would have worn out any land not almost indestructible. The presence of acid, by restraining the productive powers of the soil, has in a great measure saved it from exhaustion; and after a course of cropping which would have utterly ruined soils much better constituted, the powers of our acid land remain not greatly impaired, though dormant, and ready to be called into action by merely being relieved of its acid quality. A few crops will reduce a new acid field to so low a rate of product, that it scarcely will pay for its cultivation—but no great change is afterwards caused, by continuing scourging tillage and grazing, for fifty years longer. Thus our acid soils have two remarkable and opposite qualities, both proceeding from the same cause: they cannot be enriched by manure, nor impoverished by cultivation, to any great extent. Qualities so remarkable deserve all our powers of investigation: yet their very frequency seems to have caused them to be overlooked—and our writers on agriculture have continued to urge those who seek improvement to apply precepts drawn from English authors, to soils which are totally different from all those for which their instructions were intended.

CHAPTER VIII.

THE MODE OF OPERATION OF CALCAREOUS EARTH IN SOILS.

PROPOSITION 3. *The fertilizing effects of calcareous earth are chiefly produced by its power of neutralizing acids, and of combining putrescent manures with soils, between which there would otherwise be but little, if any, chemical attraction.*

PROPOSITION 4. *Poor and acid soils cannot be improved durably, or profitably, by putrescent manures, without previously making them calcareous, and thereby correcting the defect in their constitution.*

It has already been made evident that the presence of calcareous earth in a natural soil causes great and durable fertility: but it still remains to be determined, to what properties of this earth its peculiar fertilizing effects are to be attributed.

Chemistry has taught that silicious earth, in any state of division, attracts but slightly, if at all, any of the parts of putrescent animal and vegetable matters.* But even if any slight attraction really exists when the earth is minutely divided for experiment in the laboratory of the chemist, it cannot be exerted by silicious sand in the usual form in which nature gives it to soils—that is, in particles comparatively coarse, loose, and open, and yet each particle impenetrable to any liquid, or gaseous fluid that might be passing through the va-

* Agr. Chem. page 129.

cancies. Hence, silicious earth can have no power, chemical or mechanical, either to attract enriching manures, or to preserve them when actually placed in contact: and soils in which the qualities of this earth greatly predominate, must give out freely all they have received, not only to a growing crop, but to the sun, air, and water, so as soon to lose the whole. No portion of putrescent matter can remain longer than the completion of its decomposition—and if not arrested during this process, by the roots of living plants, all will escape in the form of gas, into the air, without leaving a trace of lasting improvement. With a knowledge of these properties, we need not resort to the common opinion that manure sinks through sandy soils, to account for its rapid disappearance.*

Aluminous earth, by its closeness, mechanically excludes those agents of decomposition, heat, air and moisture, which sand so freely admits; and therefore clay soils, in which this earth predominates, give out manure much more slowly than sand, whether for waste or for use. The practical effect of this is universally understood—that clay soils retain manure much longer than sand, but require much heavier applications to show as much effect at once. But as this means of retaining manure is altogether mechanical, it serves only to delay both its use and its waste. Aluminous

* Except the very small proportions of earthy, saline and metallic matters that may be in animal and vegetable manures, the whole balance of their bulk (and the whole of whatever can feed plants,) is composed of diuerent elements, which are known only in the forms of gases—into which they must be finally resolved, after going through all the various stages of fermentation and decomposition. So far from sinking in the earth, these final results could not be possibly confined there, but must escape into the atmosphere as soon as they take a gaseous form, unless immediately taken up by the organs of growing plants. It is probable that but a small portion of any dressing of manure remains long enough in the soil to make this final change—and that nearly all is used by growing plants, during previous changes, or carried off by air and water. During the progress of the many changes caused by fermentation and decomposition, every soluble product may certainly sink as low as the rains penetrate: but it cannot descend lower than the water, and that, together with the soluble manure, will be again drawn up by the roots of plants. One exception, however, seems probable. Should the soil need draining, to take off water passing beneath the surface, the soluble manure might be carried off by those springs; and this supposed result receives strong confirmation from the complete loss of fertility which is often observed in spots over a foundation that is springy in wet seasons, but which have been kept under tillage, without being drained. We are as yet but little informed as to the particular changes made, and the various new substances successively formed, and then decomposed, during the whole duration of putrescent manures in the soil—and no field for discovery would better reward the investigations of the agricultural chemist. For want of this knowledge we proceed at random in using manures, instead of being enabled to conform to any rule founded on scientific principles: nor can we hope so to manage manures with regard to their fermentation, the time and manner of application, mixing with other substances, &c., as to enable the crops to seize every enriching result as soon as it is produced, and to postpone as long as possible the final results of decomposition—which ought to be the ends sought in every application of putrescent manure.

earth also exerts some chemical power in attracting and combining with manures, but too weakly to enable a clay soil to become rich by natural means. For though clays are able to exert more force than sand, in holding manures, their closeness also acts to deny admittance beneath the surface to the enriching matters furnished by the growth and decay of plants: and therefore, before being brought into cultivation, a poor clay soil would derive scarcely any benefit from its small power of combining chemically with putrescent matters. If then it is considered how small is the power of silicious and aluminous earths to receive and retain putrescent manures, it will cease to cause surprise that such soils cannot be thus enriched, with profit, if at all.

Davy states that both aluminous and calcareous earth will combine with any vegetable extract, so as to render it less soluble, and consequently not subject to the waste that would otherwise take place, and hence "that the soils which contain most alumina and carbonate of lime, are those which act with the greatest chemical energy in preserving manures." Here is high authority for calcareous earth possessing the power which my subject requires, but not in so great a degree as I think it deserves. Davy apparently places both earths in this respect on the same footing, and allows to aluminous soils retentive powers equal to the calcareous. But though he gives evidence (from chemical experiments) of this power in both earths, he does not seem to have investigated the difference of their forces. Nor could he deem it very important, holding the opinion which he elsewhere expresses, that calcareous earth acts "merely by forming a useful earthy ingredient in the soil," and consequently attributing to it no remarkable chemical effects as a manure. I shall offer some reasons for believing that the powers of attracting and retaining manure, possessed by these two earths, differ greatly in force.

Our aluminous and calcareous soils, through the whole of their virgin state, have had equal means of receiving vegetable matter; and if their powers for retaining it were nearly equal, so would be their acquired fertility. Instead of this, while the calcareous soils have been raised to the highest condition, many of the tracts of clay soil remain the poorest and most worthless. It is true that one labored under acidity, from which the other was free. But if we suppose nine-tenths of the vegetable matter to have been rendered useless by that poisonous quality, the remaining tenth, applied for so long a time, would have made fertile, any soil that had the power to retain the enriching matter.

Many kinds of shells are partly composed of gelatinous animal matter, which I suppose, must be chemically combined with the calcareous earth, and by that means only is preserved from the putrefaction and waste that would otherwise certainly and speedily take place. Indeed, the large proportion of animal matter which thus helps to constitute shells, instead of making them more perishable, serves to increase their firmness and solidity. When long exposure, as in fossil shells, has destroyed all animal matter, the texture of the calcareous substance is greatly weakened. A simple experiment will serve to separate and make manifest to the eye, the animal matter, which is thus combined with and preserved by the calcareous

earth. If a fresh water muscle shell is kept for some days immersed in a weak mixture of muriatic acid and water, all the calcareous part will be gradually dissolved, leaving the animal matter so entire, as to appear still to be a whole shell—but which when lifted from the fluid which supports it, will prove to be entirely a flaccid, gelatinous, and putrescent substance, without a particle of calcareous matter being left. Yet this substance which is so highly putrescent when alone, would have been preserved in combination with calcareous matter, in the shell, for many years, if exposed to the usual changes of air and moisture—and if secured from such changes, would be almost imperishable.

Calcareous earth has power to preserve those animal matters which are most liable to waste, and which give to the sense of smell full evidence when they are escaping. Of this, a striking example is furnished by an experiment which was made with care and attention. The carcass of a cow that was killed by accident in May, was laid on the surface of the earth, and covered with about seventy bushels of finely divided fossil shells and earth, (mostly silicious,) their propositions being as thirty-six of calcareous, to sixty-four of silicious earth. After the rains had settled the heap, it was only six inches thick over the highest part of the carcass. The process of putrefaction was so slow, that several weeks passed before it was over; nor was it ever so violent as to throw off any effluvia that the calcareous earth did not intercept in its escape, so that no offensive smell was ever perceived. In October, the whole heap was carried out and applied to one-sixth of an acre of wheat—and the effect produced far exceeded that of the calcareous manure alone, which was applied at the same rate on the surrounding land. No such power as this experiment indicated (and which I have repeated in various modes, and always with like results,) will be expected from clay.

Quicklime is used to prevent the escape of offensive effluvia from animal matter; but its operation is entirely different from that of calcareous earth. The former effects its object by "eating" or decomposing the animal substance, (and nearly destroying it as manure,) before putrefaction begins. The operation of calcareous earth is to moderate and retard, but not to prevent putrefaction—not to destroy the animal matter, but to preserve it effectually, by forming new combinations with the products of putrefaction. This important operation will be treated of more fully in a subsequent chapter.

The power of calcareous earth to combine with and retain putrescent manure, implies the power of fixing them in any soil to which both are applied. The same power will be equally exerted if the putrescent manure is applied to a soil which had previously been made calcareous, whether by nature, or by art. When a chemical combination is formed between the two kinds of manure, the one is necessarily as much fixed in the soil as the other. Neither air, sun or rain, can then waste the putrescent manure, because neither can take it from the calcareous earth, with which it is chemically combined. Nothing can effect the separation of the parts of this compound manure, except the attractive power of growing plants—which as all experience shows, will draw their food from

this combination as fast as they require it, and as easily as from sand. The means then by which calcareous earth acts as an improving manure, are, *completely preserving putrescent manures from waste, and yielding them freely for use.* These particular benefits, however great they may be, cannot be seen very quickly after a soil is made calcareous, but will increase with time, and with the means for obtaining vegetable matters, until their accumulation is equal to the soil's power of retention. The kind, or the source, of enriching manure, does not alter the process described. The natural growth of the soil, left to die and rot, or other putrescent manures collected and applied, would alike be seized by the calcareous earth, and fixed in the soil.

This, the most important and valuable operation of calcareous earth, gives nothing to the soil—but only secures the other manures, and gives them wholly to the soil. In this respect, the action of calcareous earth on soils, is precisely like that of mordants in "setting" or fixing colors. When alum, for example, is used by the dyer for this purpose, it adds not the slightest tinge of itself—but it holds to the cloth, and also to the otherwise fleeting dye, and thus fixes them permanently together. Without the mordant, the color might have been equally vivid, but would be lost by the first wetting of the cloth.

The next most valuable property of calcareous manures for the improvement of soil, is their *power of neutralizing acids*, which has already been incidentally brought forward in the preceding chapter. According to the views already presented, our poorest cultivated soils contain more vegetable matter than they can beneficially use—and when first cleared, have it in great excess. So antiseptic is the acid quality of poor woodland, that before the crop of leaves of one year can entirely rot, two or three others will have fallen—and there are always enough, at any one time, to greatly enrich the soil, if the leaves could be rotted and fixed in it, at once.* The presence of acid, by preventing or retarding putrefaction, keeps the vegetable matter inert, and even hurtful on cultivated land; and the crops are still further injured, by taking up the poisonous acid, with their nutriment. A sufficient quantity of calcareous earth mixed with such a soil, will immediately neutralize the acid, and destroy its powers: the soil, released from its baneful influence, will be rendered capable, for the first time, of exerting the fertility which it really

*The antiseptic effect of vegetable acid in our soils receives some support from the facts established with regard to *peat soils*, in which vegetable acids have been discovered by chemical analysis: and though the peat or moss soils of Britain differ entirely from any soils in this country, still some facts relating to the former class, may throw light on the properties of our own soils, different as they may be. Not only does vegetable matter remain without putrefaction in peat soils and bogs, and serve to increase their depth by regular accessions from the successive annual growths, but even the bodies of beasts and men have been found unchanged under peat, many years after they had been covered. [Aiton's Essay on Moss Earth.] It is well known that the leaves of trees rot very quickly on the rich limestone soils of the western states, while the successive crops of several years' growth may be always found on our acid woodland, in the different stages of their slow decomposition.

possessed. The benefit thus produced is almost immediate: but though the soil will show a new vigor in its earliest vegetation, and may even double its first crop, yet no part of that increased product is due to the direct operation of the calcareous manure, but merely to the removal of acidity. The calcareous earth, in such a case, has not made the soil richer in the slightest degree, but has merely permitted it to bring into use the fertility it had before, and which was concealed by the acid character of the soil. It will be a dangerous error for the farmer to suppose that calcareous earth can enrich soil by direct means. It destroys the worst foe of productiveness, and uses to the greatest advantage the fertilizing powers of other manures—but of itself it gives no fertility to soils, nor furnishes the least food to growing plants.

These two kinds of action are by far the most powerful of the means possessed by calcareous earth, for fertilizing soils. It has another however of great importance—or rather two others, which may be best described together as the *power of altering the texture and absorbency* of soils.

At first it may seem impossible that the same manure could produce such opposite effects on soils, as to lessen the faults of being either too sandy, or too clayey—and the evils occasioned by both the want, and the excess of moisture. Contradictory as this may appear, it is strictly true as to calcareous earth. In common with clay, calcareous earth possesses the power of making sandy soils more close and firm—and in common with sand, the power of making clay soils lighter. When sand and clay thus alter the textures of soils, their operation is altogether mechanical; but calcareous earth must have some chemical action also, in producing such effects, as its power is far greater than that of either sand or clay. A very great quantity of clay would be required to stiffen a sandy soil perceptibly, and still more sand would be necessary to make a clay soil much lighter—so that the cost of such improvement would generally exceed the benefit obtained. Greater effects on the texture of soils are derived from less quantities of calcareous earth, besides obtaining the more valuable operation of its other powers.

Every substance that is open enough for air to enter, and the particles of which are not absolutely impenetrable, must absorb moisture from the atmosphere. Aluminous earth reduced to an impalpable powder, has strong absorbing powers. But this is not the form in which such soils can act—and a close and solid clay will scarcely admit the passage of air or water, and therefore cannot absorb much moisture except by its surface. Through sandy soils, the air passes freely; but most of its particles are impenetrable by moisture, and therefore these soils are also extremely deficient in absorbent power. Calcareous earth, by rendering clay more open to the entrance of air, and closing partially the too open pores of sandy soils, increases the absorbent powers of both. To increase that power in any soil, is to enable it to draw supplies of moisture from the air, in the driest weather, and to resist more strongly the waste by evaporation, of light rains. A calcareous soil will so quickly absorb a hasty shower of rain, as to appear to have received less than adjoining land of different character: and yet if observed in summer when under tillage, some days after a rain, and when other adjacent land appears

dry on the surface, the part made calcareous will still show the moisture remaining, by its darker color. All the effects from this power of calcareous manures may be observed within a few years after their application—though none of them so strongly marked, as they are on lands made calcareous by nature, and in which, time has aided and perfected the operation. These soils present great variety in their proportions of sand and clay—yet the most clayey is friable enough, and the most sandy, firm enough, to be considered soils of good texture: and they resist the extremes of both wet and dry seasons, better than any other soils whatever. Time, and the increase of vegetable matter, will bring those qualities to the same perfection, in soils made calcareous by artificial means.

The subsequent gradual accumulation of vegetable matter in soils to which calcareous manures have been applied, must also aid the improvement of their texture and absorbing power. The vegetable matter also darkens the color of the soil, which makes it warmer by more freely absorbing the rays of the sun.

Additional and practical proofs of all the powers of calcareous earth will be furnished, when its use and effects as manure will be stated. I flatter myself however, that enough has already been said both to establish, and account for, the different capacities of soils for improvement by putrescent manures. If the power of fixing manures in soils, has been correctly ascribed to calcareous earth, that alone is enough to show that soils containing that ingredient in sufficient quantity, must become rich—and that aluminous and silicious earths mixed in any proportions, can never form other than a sterile soil.

The object of this essay is to treat only of calcareous earth (as before defined) as a manure, and not of pure lime, nor of manures in general. Still the nature of that which is properly my subject, is so intimately connected with some other kinds of manures, and is so liable to be confounded with others, which act very differently, that frequent references to both classes have been, and will be again necessary. To make such references more plain and useful, some general remarks and opinions will now be submitted as to the peculiar modes of the operation of various manures, and particularly of lime.

Until now, I have been careful to say but little of *pure lime*, for fear of my meaning being mistaken, from the usual practice of confounding it with calcareous earth—or of considering its first and later operations, as belonging to one and the same manure. The connexion between the manures is so intimate, yet their actions so distinct, that it is necessary to mark the points of resemblance as well as those of difference.

My own use of lime as a manure has not extended beyond a few acres; and I do not pretend to know any thing from experience, of its first or caustic effects: but Davy's simple and beautiful theory of its operation carries conviction with it, and in accordance with his opinions I shall state the theory, and thence attempt to deduce its proper practical use.

By a sufficient degree of heat, the carbonic acid is driven off from shells, limestone, or chalk, and the remainder is pure or caustic lime. In this state it has a powerful decomposing power on all

putrescent animal and vegetable matters, which it exerts on every such substance in the soils to which it is applied as manure. If the lime thus meets with solid and inert vegetable matters, it hastens their decomposition, renders them soluble, and brings them into use and action as manure. But such vegetable and animal matters as were already decomposed, and fit to support growing plants, are injured by the addition of lime—as the chemical action which takes place between these bodies, forms different compounds which are always less valuable than the putrid or soluble matters were, before being acted on by the lime. [*Agr. Chem. Lecture 7.*]

This theory of Davy's, will direct us to expect profit from liming all soils containing much unrotted and inert vegetable matter, as our acid woodland when first cleared, and perhaps worn fields, covered with broom grass—and to avoid the application of lime, or (what is the same thing,) to destroy previously its caustic quality by exposure to the air, on all good soils containing soluble vegetable or animal matters, and on all poor soils deficient in inert, as well as active nourishment for plants. The warmth of our climate so much aids the fermentation of all putrescent matters in soils, that it can seldom be required to hasten it by artificial means: to check its rapidity is much more necessary, to avoid the waste of manures in our lands. But in England, and still more in Scotland, the case is very different. There, the coldness and moisture of the climate greatly retard the fermentation of the vegetable matter that falls on the land—so much so, that in certain situations the most favorable to such results, the vegetable cover is increased by the deposit of every successive year, and forms those vegetable soils, which are called *moor, peat*, and *bog* lands. Vegetable matter abounds in these soils, sometimes it even forms the greater bulk for many feet in depth—but it is inert, insoluble, and useless, and the soil is unable to bring any useful crop, though containing vegetable matter in such excess. Many millions of acres in Britain, are of the different grades of peat soils, of which not an acre exists in the eastern half of Virginia. Upon this ground of the difference of climate, and its effects on fermentation, I deduce the opinion that *lime* would be serviceable

much more generally in Britain than here: and indeed that there are very few cases in which the caustic quality would not do our arable lands more harm than good. This is no contradiction of the great improvements which have been made on some farms by applying lime—because its caustic quality was seldom allowed to act at all. Lime is continually changing to the carbonate of lime, and in practice, no exact line of separation can be drawn between the transient effects of the one, and the later, but durable improvement from the other. Lime powerfully attracts the carbonic acid, of which it was deprived by heat, and that acid is universally diffused through the atmosphere (though in a very small proportion,) and is produced by every decomposing putrescent substance. Consequently caustic lime on land, is continually absorbing and combining with this acid; and with more or less rapidity, according to the manner of its application, is returning to its former state of mild calcareous earth. If spread as a top dressing on grass lands—or on ploughed land, and superficially mixed with the soil by harrowing—or used in composts with fermenting vegetable matter—the lime is probably completely carbonated, before its causticity can act on the soil. In no case can lime, applied properly as manure, long remain caustic in the soil. Thus most applications of lime are simply applications of calcareous earth, but acting with greater power at first, in proportion to its quantity, because more finely divided, and more equally distributed.

By adopting the views which have been presented of the action of calcareous earth, and of lime, as manures, and those which are generally received as to the mode of operation of other manures, the following table has been constructed, which may be found useful, though necessarily imperfect, and in part founded only on conjecture. The various particular kinds of manures are arranged in the supposed order of their power, under the several heads or characters to which they belong; and when one manure possesses several different modes of action, the comparative force of each is represented by the letters annexed—the letter *a* designating its strongest or most valuable agency, *b* the next strongest, and so on.

CLASSIFICATION OF MANURES.

Substances which form manures are either

<i>Alimentary</i> , or serving as food for plants—as	- Feathers, hair, woollen rags, - Pounded bones, (b) - All putrescent animal and vegetable substances, as - Dung, - Stable and farmyard manures, (a) - Straw, (a) - Green crops ploughed in. (a)
<i>Solvent</i> of alimentary manures—as	- Quicklime, (a) - Potash and soap lie? (a) - Ashes not drawn? (d) - Paring and burning the surface of the soil. (a)
<i>Mordants</i> —serving to fix other manures in soils—as	- Calcareous earth, including - Lime become mild by age, (a) - Chalk, (a) - Limestone gravel, (a) - Wood ashes, (b) - Fossil shells, (a) - Marl (a calcareous clay,) (a) - Old mortar.
<i>Neutralizing acids</i> —as	- All calcareous manures, (b) - Quicklime, (b) - Potash and soap lie, (b) - Wood ashes. (c)
<i>Mechanical</i> , or improving by altering the texture of soil—as	- All calcareous manures, (c) - Marl, (b) - Clay, - Sand, - Fermenting vegetable manures, (b) - Green manures, (b) - Unfermented litter. (b)
<i>Stimulating</i> —as	- Nitre? - Common salt?
<i>Specific</i> , or furnishing ingredients necessary for particular plants—as	- Sulphate of lime, or gypsum, (for clover,) - Phosphate of lime, (for wheat) in - Bones, (a) and - Drawn ashes, (a) - Salt?

PART II—*Practice.*

CHAPTER IX.

GENERAL OBSERVATIONS ON MARL AND LIME. EFFECTS OF CALCAREOUS MANURES ON ACID SANDY SOILS, NEWLY CLEARED.

PROPOSITION 5. *Calcareous manures will give to our worst soils a power of retaining putrescent manures, equal to that of the best—and will cause more productiveness, and yield more profit, than any other improvement practicable in Lower Virginia.*

The theory of the constitution of fertile and barren soils, has now been regularly discussed: it remains to show its practical application, in the use of calcareous earth as a manure. If the opinions which have been maintained are unsound, the attempt to reduce them to practice will surely expose their futility: and if they pass through that trial, agreeing with, and confirmed by facts, their truth and value must stand unquestioned. The belief in the most important of these opinions, (the incapacity of poor soils for improvement, and its cause;) directed the commencement of my use of calcareous manures; and the manner of my practice has also been directed entirely by the views which have been exhibited. Yet in every respect the results of practice have sustained the theory of the action of calcareous manures—unless there be found an exception in the damage which has been caused by applying too heavy dressings to weak lands.

My use of calcareous earth as manure, has been almost entirely confined to that form of it which is so abundant in the neighborhood of our tide-waters—the beds of *fossil shells*, together with the earth with which they are found mixed. The shells are in various states—in some beds generally whole, and in others, reduced nearly to a coarse powder. The earth which fills their vacancies, and serves to make the whole a compact mass, in most cases is principally silicious sand, and contains no putrescent or valuable matter, other than the calcareous. The same effects might be expected from calcareous earth in any other form, whether chalk, limestone gravel, wood ashes, or lime—though the two last have other qualities besides the calcareous. During the short time that lime can remain *quick* or *caustic*, after being applied as manure, it exerts (as before stated) a solvent power, sometimes beneficial and at others hurtful, which has no connexion with its subsequent and permanent action as calcareous earth.

These natural deposits of fossil shells are commonly, but very improperly, called *marl*. This misapplied term is particularly objectionable, because it induces erroneous views of this manure. Other earthy manures have long been used in England under the name of marl, and numerous publications have described their general effects, and recommended their use. When the same name is given here to a different manure, many

persons will consider both operations as similar, and perhaps may refer to English authorities for the purpose of testing the truth of my opinions, and the results of my practice. But no two operations called by the same name, can well differ more. The process which it is my object to recommend, is simply *the application of calcareous earth in any form whatever, to soils wanting that ingredient*, and generally quite destitute of it: and the propriety of the application depends entirely on our knowing that the manure contains calcareous earth, and what proportion, and that the soil contains none. In England, the most scientific agriculturists apply the term *marl* correctly to a *calcareous clay*, of peculiar texture: but most authors, as well as mere cultivators, have used it for any smooth soapy clay, which may, or may not have contained, so far as they knew, any proportion of calcareous matter. Indeed, in most cases, they seem unconscious of the presence, as well as of the importance of that ingredient, by not alluding to it when attempting most carefully to point out the characters by which marl may be known. Still less do they inquire into the deficiency of calcareous earth in soils proposed to be marled—but apply any earths which either science or ignorance may have called *marl*, to any soils within a convenient distance—and rely upon the subsequent effects to direct whether the operation shall be continued or abandoned. Authors of the highest character, (as Sinclair and Young, for example,) when telling of the practical use, and valuable effects of marl, omit giving the strength of the manure, and generally even its nature—and in no instance have I found the ingredients of the soil stated, so that the reader might learn what kind of operation really was described, or be enabled to form a judgement of its propriety. From all this, it follows that though what is called *marling* in England may sometimes (though very rarely, as I infer) be the same chemical operation on the soil that I am recommending, yet it may also be, either applying clay to sand, or clay to chalk, or true marl to either of those soils—and the reader will generally be left to guess in every separate case, which of all these operations is meant by the term *marling*. For these reasons, the practical knowledge to be gathered from all this mass of written instruction on marling, will be far less abundant, than the inevitable errors and mistakes. The recommendations of marl by English authors, induced me very early to look to what was here called by the same name, as a means for improvement: but their descriptions of the manure convinced me that our marl was nothing like theirs, and thus actually deterred me from using it, until other views instructed me that its value did not depend on its having “a soapy feel,” or on any mixture of clay whatever. [Appendix. G.]

Nevertheless, much valuable information may be obtained from these same works, on calcareous manure, or on marl, (in the sense it is used among us)—but under a different head, viz. *lime*. This

manure is generally treated of with as little clearness or correctness, as is done with marl: but the reader at least cannot be mistaken in this, that the ultimate effect of every application of lime, must be to make the soil more calcareous—and to that cause solely are to be imputed all the long-continued beneficial consequences, and great profits, which have been derived from liming. But excepting this one point, in which we cannot be misled by ignorance, or want of precision, the mass of writings on lime, as well as on calcareous manures in general, will need much sifting to yield instruction. The opinions published on the operation of lime, are so many, so various, and contradictory, that it seems as if each author had hazarded a guess, and added it to a compilation of those of all who had preceded him. For a reader of these publications to be able to reject all that is erroneous in reasoning, and in statements of facts—or inapplicable, on account of difference of soil, or other circumstances—and thus obtain only what is true, and valuable—it would be necessary for him first to understand the subject better than most of those whose opinions he was studying. It was not possible for them to be correct, when treating (as most do) of *lime* as one kind of manure, and every different form of the *carbonate of lime*, as so many others. Only one distinction of this kind (as to operation and effects) should be made, and never lost sight of—and that is one of substance, still more than of name. Pure or quicklime, and carbonate of lime, are manures entirely different in their powers and effects. But it should be remembered that the substance that was *pure lime* when just burned, often becomes *carbonate of lime* before it is used, (by absorbing carbonic acid from the atmosphere,)—still more frequently before a crop is planted—and probably always, before the first crop ripens. Thus, it should be borne in mind that the manure spoken of as *lime*, is often at first, and always at a later period, neither more nor less than calcareous earth: that lime, which at different periods, is two distinct kinds of manure, is considered in agricultural treatises as only one: and to calcareous earth are given as many different names, all considered to have different values and effects, as there are different forms and mixtures of the substance presented by nature.

But however incorrect and inconvenient the term *marl* may be, custom has too strongly fixed its application for any proposed change to be adopted. Therefore, I must submit to use the word *marl* to mean beds of fossil shells, notwithstanding my protest against the propriety of its being so applied.

The following experiments are reported, either on account of having been accurately made, and carefully observed, or as presenting such results as have been generally obtained on similar soils, from applications of fossil shells to nearly six hundred acres of Coggin's Point Farm. It has been my habit to make written memoranda of such things; and the material circumstances of these experiments were put in writing at the time they occurred, or not long after. Some of the experiments were, from their commencement, designed to be permanent, and their results to be measured as long as circumstances might permit. These were made with the utmost care. But generally, when precise amounts are not stated, the experiments were less carefully made, and their results

reported by guess. Every measurement stated, of land, or of crop, was made in my presence. The average strength of the manure was ascertained by a sufficient number of analyses—and the quantity applied was known by measuring some of the loads, and having them dropped at certain distances. At the risk of being tedious, I shall state every circumstance supposed to affect the results of the experiments—and the manner of description, and of reference, necessary to use, will require a degree of attention that few readers may be disposed to give, to enable them to derive the full benefit of these details. But however disagreeable it may be to give to them the necessary attention, I will presume to say that these experiments deserve it. They will present practical proofs of what otherwise would be but uncertain theory—and give to this essay its principal claim to be considered useful and valuable.

When these operations were commenced, I knew of no other experiments having been made with fossil shells, except two, which had been tried long before, and were considered as proving the manure too worthless to be resorted to again.* Inexperience, and the total want of any practical guide, caused my applications, for the first few years, to be frequently injudicious, particularly as to the quantities laid on. For this reason, these experiments show what was actually done, and the effects thence derived, and not what better information would have directed, as the most profitable course.

The measurements of corn that will be reported were all made at the time and place of gathering.

* The earliest of these old experiments was made at Spring Garden in Surry, about 1775. The extent marled was eight or ten acres, on poor sandy land. Nothing is now known of the effects for the first twenty-five or thirty years, except that they were too inconsiderable to induce a repetition of the experiment. The system of cultivation was as exhausting as was usual during that time. Since 1812, the farm has been under mild and improving management generally. No care has been taken to observe the progress either of improvement or exhaustion on the marled piece: but there is no doubt but that the product has continued for the last fifteen years better than that of the adjacent land. Mr. Francis Ruffin, the present owner of the farm, believed that the product was not much increased in favorable seasons; but when the other land suffered either from too much wet, or dry weather, the crop on the marled land was comparatively but slightly injured. The loose reports that have been obtained respecting this experiment, are at least conclusive in showing the permanency of the effects produced.

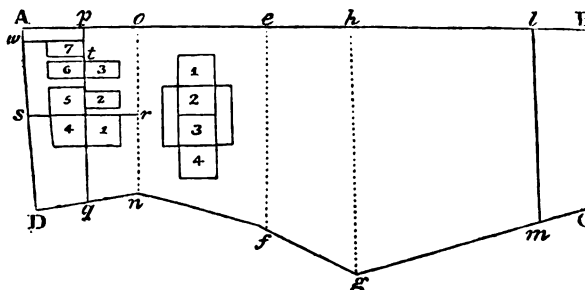
The other old experiment referred to, was made at Aberdeen, Prince George county, in 1803, by Mr. Thomas Cocke. Three small spots (neither exceeding thirty yards square,) of poor land, kept before and since generally under exhausting culture, were covered with this manure. He found a very inconsiderable early improvement, which he thought altogether an inadequate reward for the labor of applying the marl. The experiment being deemed of no value, was but little noticed until the commencement of my use of the same manure. On examination, the improvement appeared to have increased greatly on two of the pieces, but the third was evidently the worse for the application. For a number of years after making this experiment, Mr. Cocke considered it as giving full proof of the worthlessness of the manure. But more correct views of its mode of operation have since induced him to recommence its use, and no one has met with more success, or produced more valuable improvements.

The measure used for all except very small quantities, was a barrel holding five bushels when filled level, and which being filled twice with ears of corn, well shaken to settle them, and heaped, was estimated to make five bushels of grain—and the products will be reported in *grain*, according to this estimate. This mode of measurement will best serve for comparing results—but in most cases it is far from giving correctly the actual quantity of dry and sound grain, for the following reasons. The common large soft grained white corn was the kind cultivated, and which was always cut down for sowing wheat before the best matured was dry enough to grind, or even to put up in cribs; and when the ears from the poorest land were in a state to lose considerably more by shrinking. Yet, for fear of some mistake occurring if measurements were delayed until the crop was gathered, these experiments were measured when the land was ploughed for wheat in October. The subsequent loss from shrinking would of course be greatest on the corn from the poorest and most backward land, as there, most defective and unripe ears would always be found. Besides, every ear, however imperfect or rotten, was included in the mea-

surement. For these several reasons, the actual increase of product on the marled land was always greater than will appear from the comparison of quantities measured: and from the statements of all such early measurements, there ought to be allowed a deduction, varying from ten per cent. on the best and most forward corn, to thirty per cent. on the latest and most defective. Having stated the grounds of this estimate, practical men can draw such conclusions as their experience may direct, from the dates and amounts of the actual measurements that will be reported. Some careful trials of the amount of shrinkage in particular experiments will be hereafter stated.

No grazing has been permitted on any land from which experiments will be reported, unless it is specially stated.

As most of the experiments on new land were made on a single piece of twenty-six acres a general description or plan of the whole will enable me to be better understood, as well as to be more concise, by references being made to the annexed figure. It forms part of the ridge lying between James River and the nearest stream running into Powell's Creek. The surface is nearly level. The



soil in its natural state very similar throughout, but the part next to the line B C somewhat more sandy, and more productive in corn, than the part next to A D—and in like manner, it is lighter along A e, than nearer to D f. The whole soil, a gray silicious acid loam, not more than two inches deep at first, resting on a yellowish sandy subsoil from one to two feet deep, when it changes to clay. Natural growth mostly pine—next in quantity, oaks of different kinds—a little of dogwood and chin-quepin—whortleberry bushes throughout in plenty. The quality of the soil is better than the average of ridge lands in general.

Experiment 1.

The part B C g h, about eleven acres, grubbed and cut down in the winter of 1814–15—suffered to lie three years with most of the wood and brush on it. February 1818, my earliest application of marl was made on B C m l, about 2½ acres. Marl, $\frac{3}{4}$ of calcareous earth, and the balance silicious sand, except a very small proportion of clay: the shelly matter finely divided. Quantity of marl to the acre, one hundred and twenty-five to two hundred heaped bushels. The whole B C g h coul-

Results. 1818. The corn on the marled land, evidently much better—supposed difference, forty per cent.

1819. In wheat. The difference as great, perhaps more so—particularly to be remarked from the commencement to the end of the winter, by the marled part preserving a green color, while the remainder was seldom visible from a short distance, and by the spring, stood much thinner, from the greater number of plants having been killed. The line of separation very perceptible through both crops.

1820. At rest. During the summer marled all B C g h, at the rate of five hundred bushels, without excepting the space before covered, and a small part of that made as heavy as one thousand bushels, counting both dressings. The shells now generally coarse—average strength of the marl, $\frac{3}{4}$ of calcareous earth. In the winter after, ploughed three inches deep as nearly as could be, which made the whole new surface yellow, by bringing barren subsoil to the top.

Results continued. 1821. In corn. The whole a remarkable growth for such a soil. The oldest (and heaviest) marled piece better than the other, but not enough so to show the dividing line. The

average product of the whole supposed to have been fully twenty-five bushels to the acre.

1822. In wheat—and red clover sowed on all the old marling, and one or two acres adjoining. A severe drought in June killed the greater part of the clover, but left it much the thickest on the oldest marled piece, so as again to show the dividing line, and to yield in 1823, two middling crops to the scythe—the first that I had known obtained from any acid soil, without high improvement from putrescent manures.

1823. At rest—nothing taken off, except the clover on B C m l.

1824. In corn—product seemed as before, and its rate may be inferred from the actual measurements on other parts, which will be stated in the next experiment, the whole being now cleared, and brought under like cultivation.

Experiment 2.

The part *e f n o*, cleared and cultivated in corn at the same times as the preceding—but treated differently in some other respects. This had been deprived of nearly all its wood, and the brush burnt, at the time of cutting down—and its first crop of corn (1818) being very inferior, was not followed by wheat in 1819. This gave two years of rest before the crop of 1821—and five years rest out of six, since the piece had been cut down. As before stated, the soil rather lighter on the side next to *o e*, than *n f*.

March, 1821. A measured acre near the middle, covered with six hundred bushels of calcareous sand ($\frac{2}{100}$) the upper layer of another body of fossil shells.

Results. 1821. In corn. October—the four adjoining quarter acres, marked 1, 2, 3, 4, extending nearly across the piece, two of them within, and two without the marled part, measured as follows:

Not marled, No. 1,	6½	} average to the acre
Do. No. 4,	5½	
Marled, No. 2,	8½	} 22½ bushels of grain.
Do. No. 3,	8½	
		} average 33½ bushels.

The remainder of this piece was marled before sowing wheat in 1821.

1823. At rest.

1824. In corn—distance 5½ by 3½ feet, making 2436 stalks to the acre. October 11th, measured two quarter acres very nearly coinciding with Nos. 2 and 3 in the last measurement. They now made

No 2. 7 bushels 3¼ pecks,	} average 31.2½
or per acre, - - - 31.1	
No 3. 8 bushels, - - - 32	
Average in 1821, - - -	33.1

Experiment 3.

The part *e f g h* was cut down in January, 1821, and the land planted in corn the same year. The coultering and after-tillage very badly executed, on account of the number of whortleberry and other roots. As much as was convenient was marled at six hundred bushels ($\frac{3}{100}$) and the dressing limited by a straight line. Distance of corn 5½ by 3½ feet—2262 stalks to the acre.

Results. 1821. October—on each side of the dividing line, a piece of twenty-eight by twenty-one corn hills measured as follows:

No. 1. 588 stalks, not marled, 2 bushels, equal to 7½ the acre.

No. 2. 588 stalks, marled, 4½ 16½ ...

1822. In wheat, the remainder having been previously marled.

1823. At rest. During the following winter it was covered with a second dressing of marl at 250 bushels ($\frac{4}{100}$) making 850 bushels to the acre altogether.

1824. In corn. Two quarter acres, chosen as nearly as possible on the same spaces that were measured in 1821, produced as follows:

No. 1. 8 bushels, 2 pecks, or to the acre, 34	
The same in 1821, before marling,	7.3½

No. 2. 7 bushels, 2½ pecks, or to the acre, 30.2	
The same in 1821, after marling,	16.1½

1825. The whole twenty-six acres, including the subjects of all these experiments and observations, were in wheat. The first marled piece in Exp. 1, was decidedly the best—and a gradual decline was to be seen to the latest. I have never measured the product of wheat from any experiment, on account of the great trouble and difficulty that would be encountered. Even if the wheat from small measured spaces could be reaped and secured separately, during the heavy labors of harvest, it would be scarcely possible afterwards to carry the different parcels through all the operations necessary to show exactly the clear grain derived from each. But without any separate measurement, all my observations convince me, that the increase of wheat from marling, is at least equal to that of corn, during the first few years, and is certainly greater afterwards, in comparison to its product before using marl.

It was from the heaviest marled part of Exp. 1, that soil was analysed to find how much calcareous earth remained in 1826, (page 26.) Before that time the marl and soil had been well mixed by ploughing to the depth of five inches. One of the specimens of this soil then examined, consisted of the following parts—the surface, and consequently the undecomposed weeds upon it, being excluded.

1000 grains of soil yielded	
769 grains of silicious sand moderately fine,	
15 finer sand,	
784	
8 calcareous earth, from the manure	
180 applied,	
finely divided clay, vegetable matter, &c.	
28 lost in the process.	
1000	

This part, it has been already stated, was originally lighter than the general texture of the land.

Experiment 4.

The four acres marked A D n o were cleared in the winter 1823–4. The lines *p q* and *r s* divide the piece nearly into quarters. The end nearest A p o is lighter, and best for corn, and was still better for the first crop, owing to nearly that half having been accidentally burnt over. After twice

coultering, marl and putrescent manures were applied as follows; and the products measured, October 11th, the same year.

s q not marled nor manured—produced on a quarter acre (No. 4.) of soft and badly filled corn,

Bush. P.

3 bushels, or per acre - - - 12.

q r and *r p*, marled at 800 bushels ($\frac{45}{100}$)

by three measurements of different pieces—

Quarter acre (No. 1.) 5 bushels, very nearly, or - - - 19.3½

Eighth (No. 2.) 2.3½ } average { 22.2

Eighth (No. 3.) 3.1½ } 24.1½ } 27.

s t manured at 900 to 1100 bushels to the acre, of which,

Quarter acre (No. 5.) with rotted corn stalks, from a winter cow-pen, gave 5.2½ 22.2

Eighth (No. 6.) with stable manure, 4.1½ 35.2

Eighth (No. 7.) covered with the same heavy dressings of stable manure, and of marl also, gave 4.2 36.

p w, marled at 450 bushels, brought not so good a crop as the adjoining *r p* at 800.

The distance was 5½ by 3½ feet. Two of the quarter acres were measured by a surveyor's chain (as were four other of the experiments of 1824,) and found to vary so little from the distance counted by corn rows, that the difference was not worth notice.

1825. In wheat: the different marked pieces seemed to yield in comparison to each other, proportions not perceptibly different from those of the preceding crop—but the best not equal to any of the land marled before 1822, as stated in the 1st, 2nd, and 3rd experiments.

1827. Wheat on a very rough and imperfect summer fallow. This was too exhausting a course (being three grain crops in the four shift rotation,)—but was considered necessary to check the growth of bushes that had sprung from the

roots still living. The crop was small, as might have been expected from its preparation.

1828. Corn—in rows five feet apart, and about three feet of distance along the rows, the seed being dropped by the step. Owing to unfavorable weather, and to insects and other vermin, not more than half of the first planting of this field lived—and so much replanting of course caused its product to be much less matured than usual, on the weaker land. All the part not marled, (and more particularly that manured,) was so covered by sorrel, as to require ten times as much labor in weeding as the marled parts, which, as in every other case, bore no sorrel. October 15th, gathered and measured the corn from the following spaces, which were laid off (by the chain) as nearly as could be, on the same land as in 1824.

The products so obtained, together with those of the previous and subsequent courses of tillage, will be presented below, in a tabular form, for the purpose of being more easily compared.

On the wheat succeeding this crop, clover seed was sowed, but very thinly, and irregularly. On the parts not marled, only a few yards width received seed, which the next year showed the expected result of scarcely any living clover. On the marled portions, the growth of clover was of middling quality: was not mowed nor grazed, but seed gathered by hand both in 1830 and 1831.

1832. Again in corn. It was soon evident that much injury was caused to the marled half *q p o n*, by the too great quantity applied. A considerable proportion of the stalks, during their growth, showed strongly the marks of disease from that cause, and some were rendered entirely barren. A few stalks only had appeared hurt by the quantity of marl, in 1828. On the lightly marled piece *w p*, and where the heaviest marling was accompanied by stable manure, there has appeared no sign of injury. The products were as follows:

MARK.	DESCRIPTION.	PRODUCTS OF GRAIN PER ACRE.					
		1st course.		2nd course.		3rd course.	
		1824 October 11.		1828 October 15.		1832 October 26.	
		Bush.	Pecks.	Bush.	Pecks.	Bush.	Pecks.
<i>s q</i> .	Not marled or manured, - - - - -	12		21	1	17	3½
<i>q r</i> 1	Marled at 800 bushels, - - - - -	19	3½	28	1½	28	
<i>r p</i> 2	The same, - - - - -	22	2 }	31	0½	27	3
<i>r p</i> 3	The same, - - - - -	27					
<i>s t</i> 5	Cow-pen manure, 900 to 1100 bushels, - - - - -	22	2	25	2	Better than <i>s q</i>	
<i>s t</i> 6	Stable manure, 900 to 1100 bushels, - - - - -	35	2	29		28	1
<i>w t</i> 7	Marl and stable manure, both as above, - - - - -	36		33	2	37	3½
<i>w p</i>	Marled at 450 bushels, - - - - -	{ Less than <i>r</i> }		{ Equal to <i>r p</i> }		31	3
		{ <i>p</i> (800) }					

An accidental omission prevented the measurement of *s t* 5, in 1832.

This experiment has been made with much trouble, and every care bestowed to insure accuracy. Still several causes have operated to affect the correctness of the results, and to prevent the comparative products showing the true rate of improvement either from marl, or the putrescent manure. These causes will be briefly stated.

1st. The quantity of marl (800 bushels) on *q r* and *r p* is nearly double the amount that ought to have been used: and this error has not only in-

creased the expense uselessly, but has served to prevent the increase of product that would otherwise have taken place. This loss is proved by the gradual increase, and at last the greater product of *w p* marled at only 450 bushels.

2nd. The comparative superiority of all the marled ground to *s q* not marled, is lessened by this circumstance: most of the large logs, as well as all the small branches, were burnt upon the land, when it was cleared in 1824, before the ex-

periment was commenced; and the ashes have durably improved a spot where each of these large fires were made on *s q*, but have done no good, and perhaps have been injurious, to the marled pieces that were made sufficiently calcareous without the addition of ashes. At least, the good effect of ashes is very evident on *s q*, and has helped somewhat to increase all its measured products, and no such benefit has been visible on the marled parts.

3rd. The quantity of putrescent manure applied to *s t* (900 to 1100 bushels) was much too great both for experiment and profit: and the quantity, together with the imperfectly rotted state of the stable manure, has given more durability to the effect, than is to be expected from a more judicious and economical rate of manuring.

For these several reasons, it is evident that far more satisfactory results than even these, would have been obtained if only half as much of either marl or manure had been applied.

There are other circumstances to be considered, which if not attended to, will cause the compara-

tive increase or decrease of product in this experiment to be misunderstood. It is well known that poor land put under tillage immediately after being cleared, as this was in 1824, will not yield near as much as on the next succeeding course of crops. This increase, which depends merely on the effects of time, operates independently of all other means for improvement that the land may possess; and its rate, in this experiment, may be fairly estimated by the increase on the piece *s q* from 1824 to 1828. The increase here, where time only acted, was from 12 to 21½ bushels: but as the corn gathered here was always much the most imperfectly ripened, and would therefore lose the most by shrinking, I will suppose eight bushels to be the rate of increase from time, and that so much of the product of all the pieces should be attributed to that cause. Then to estimate alone the increased or diminished effects of marl, or manure on the other pieces, eight bushels should be deducted from all the different applications, the estimate will stand thus:

	1824	1828	DEDUCT FOR TIME.	INCREASE.	DECREASE.	
	B. P.	B. P.	B.	B. P.	B. P.	
<i>q r</i> 1	19 3½	28 1½	8	0 2	—	From 800 bushels of marl.
<i>r p</i> 2	22 2	31	8	—	1 1½	— 800 bushels of marl.
<i>r p</i> 3	27	25	8	—	5 2	— 1000 bushels of cow-pen manure.
<i>s t</i> 5	22 2	29	8	—	14 2	— 1000 bushels of stable manure.
<i>s t</i> 6	35 2					

Even the piece covered with both marl and stable manure, (*w t*) shows according to this estimate a diminished effect equal to 10½ bushels; which was owing to the marl not being able to combine with, and fix so great a quantity of manure, in addition to the vegetable matter left by its natural growth of wood. The piece *w p* marled at 450 bushels alone, has shown a steady increase of product at each return of tillage, and thereby has given evidence of its being the only improvement made in such manner as both judgment and economy would have directed.

CHAPTER X.

EFFECTS OF CALCAREOUS MANURE ON ACID CLAY SOILS, RECENTLY CLEARED.

The two next experiments were made on another field of thirty acres of very uniform quality, marled and cleared in 1826, and the succeeding years. The soil is very stiff, close, and intractable under cultivation—seems to contain scarcely any sand—but in fact, about one-half of it is composed of silicious sand, which is so fine, when separated, as to feel like flour. Only a small proportion of the sand is coarser than this state of impalpable powder. Aluminous earth of a dirty fawn color forms nearly all of its remaining ingredients. Before being cleared, the soil is not an inch deep, and all below for some feet is appa-

rently composed of the like parts of clay and fine sand. This is decidedly the most worthless kind of soil, in its natural state, that our district furnishes. It is better for wheat than for corn, though its product is contemptible in every thing: it is difficult to be made wet, or dry—and therefore suffers more than other soils from both dry and wet seasons, but especially from the former. It is almost always either too wet or too dry for ploughing—and sometimes it will pass through both states, in two or three clear and warm days. If broken up early in winter, the soil, instead of being pulverized by frost, like most clay lands, runs together again by freezing and thawing—and by March, will have a sleek (though not a very even) crust upon the surface, quite too hard to plant on before a second ploughing. The natural growth is principally white and red oaks, a smaller proportion of pine, and whortleberry bushes throughout.

Experiment 5.

On one side of this field a marked spot of thirty-five yards square was left out, when the adjoining land was marled at the rate of five hundred to six hundred bushels ($\frac{1}{12}$) to the acre. Paths for the carts were opened through the trees, and the marl dropped and spread in January, 1826: the land cleared the following winter. Most of the wood was carried off for fuel—the remaining logs and brush burnt on the ground, as usual, at such distances as were convenient to the laborers. This

part was perhaps the poorer, because wood had previously been cut here for fuel; though only a few trees had been taken, here and there, without any thing like clearing the land.

Results. 1827. Planted in corn the whole recent clearing of fifteen acres—all marled, except the spot left out for experiment: broken up late and badly, and worse tilled, as the land was generally too hard, until the season was too far advanced to save the crop. The whole product so small, that it was useless to attempt to measure the products. The difference would have been only between a few imperfect ears on the marled ground, and still less—indeed almost nothing—on that not marled.

1828. Again in corn: as well broken and cultivated as usual for such land. October 18th—cut down four rows of corn running through the land not marled, and eight others, alongside on the marled—all fifty feet in length. The rows had been laid off for five and a half feet—but were found to vary a few inches—for which the proper allowance was made, by calculation. The spaces taken for measurement were caused to be so small, by a part of the corn having been inadvertently cut down and shocked, just before. The ears were shelled when gathered; and the products, measured in a vessel which held (by trial) $\frac{1}{8}$ of a bushel, were as follows:

On land not marled
4 rows, average 5 feet, and 50 in length, (500 square feet) - - 13 $\frac{1}{2}$ measures,
or to the acre, - - 7 $\frac{1}{2}$ bushels.

On adjoining marled land
4 rows, average 5 feet 1 $\frac{1}{2}$ inches by 50 feet = 512 square feet, - - 25 $\frac{3}{4}$ measures,
or to the acre, - - 13 $\frac{1}{2}$ bushels.
4 next rows, 5 feet 4 $\frac{1}{2}$ inches by 50 = 537 square feet, - - 27 $\frac{1}{2}$ measures,
or to the acre, - - 14 bushels.

1829. In wheat.

1830. At rest—the weeds, a scanty cover.

1831. In corn. October 20th—measured by the chain equal spaces, and gathered and measured their products. The corn not marled was so imperfectly filled, that it was necessary to shell it, for fairly measuring the quantity. The marled parcels, being of good ears generally, were measured as usual, by allowing two heaped measures of ears, for one of grain.

On land not marled
363 square yards made - - 8 gallons,
or to the acre, - - 5 bushels.

On marled land close adjoining on one side,
363 square yards made rather more than 6 gallons—to the acre, - - 10 bushels.
363 square yards on another side, made not quite 8 gallons, or to the acre, - - 12 bushels.

The piece not marled coincided with that measured in 1828, as nearly as their difference of size and shape permitted—as did the last named marled piece, with the two of 1828. The last crop was greatly injured by the wettest summer that I have ever known, which has caused the decrease of product exhibited in this experiment—which will be best seen in this form:

	Product of grain to the acre.			
	1828.		1831.	
	October 18.		October 20.	
Not marled, - -	Bush.	Pecks.	Bush.	Pecks.
Marled, (averaged,)	7	1	5	0
	13	3	11	0

Experiment 6.

West.	e	D	
	C	A	E
	f	B	

The remainder of the thirty acres, was grubbed during the winter 1826-7—marled the next summer at five hundred to six hundred bushels the acre: marl $\frac{4}{15}$. A rectangle (A) 11 by 13 poles, was laid off by the chain and compass, and left without marl. All the surrounding land supposed to be equal in quality with A—and all level, except on the sides E and B, which were partly sloping, but not otherwise different. The soil suited to the general description given before—no natural difference known or suspected, between the land on which Exp. 5 was made, and this, except that the latter had not been robbed of any wood for fuel, before clearing. The large trees (all more than ten inches through,) were belted, and the smaller cut down in the beginning of 1828, and all the land west of the line *e f* was planted in corn. As usual, the tillage bad, and the crop very small. The balance lying east of *e f*, was coultured once, but as more labor could not be spared, nothing more was done with it until the latter part of the winter 1829, when it was broken by two-horse ploughs, oats sowed and covered by trowel ploughs—then clover sowed, and a wooden-tooth harrow passed over to cover the seed, and to smooth down, in some measure, the masses of roots and clods.

Results. 1829. The oats produced badly—but yielded more for the labor required, than corn would have done. The young clover on the marled land was remarkably good, and covered the surface completely. In the unmarled part, A, only two casts through had been sown, for comparison, as I knew it would be a waste of seed. This looked as badly as had been expected.

1830. The crop of clover would have been con-

sidered excellent for good land, and most extraordinary for so poor a soil as this. The strips sowed through A, had but little left alive, and that scarcely of a size to be observed, except one or two small tufts, where I supposed some marl had been deposited by the cleaning of a plough, or that ashes had been left, from burning the brush. The growth of clover was left undisturbed until after midsummer, when it was grazed by my small stock of cattle, but not closely.

1831. Corn on the whole field. October 20th, measured carefully half an acre (10 by 8 poles) in A, the same in D, and half as much (10 by 4) in E. No more space could be taken on this side, for fear of getting within the injurious influence of the contiguous woods. No measurement was made on the side B, because a large oak, which belting had not killed, affected its product considerably. Another accidental circumstance prevented my being able to know the product of the side C, which however was evidently and greatly inferior to all the marled land on which oats and clover had been raised. This side had been in corn, followed by wheat, and then under its spontaneous growth of weeds. The corn on each of the measured spaces was cut down, and put in separate shocks—and on Nov. 25th, when well dried, the parcels were *shucked* and measured, before being moved. We had then been gathering and storing the crop, for more than fifteen days—and therefore these measurements may be considered as showing the amount of dry and firm grain, without any deduction being required for shrinkage.

Bushels. Pecks.

A (Half acre) made $7\frac{1}{4}$ bushels of ears, or of grain to the acre,	- 7	1
D (Half acre) $16\frac{1}{2}$	- - 16	3
E (Quarter acre) 11	- - 22	

The sloping surface of the side E, prevented water from lying on it, and therefore it suffered less, perhaps not at all, from the extreme wetness of the summer, which evidently injured the growth on A and D, as well as of all the other level parts of the field.

1832. The field in wheat.

1833. In clover, which was grazed, though not closely, after it had reached its full growth.

1834. Corn, a year earlier than would have been permitted by the four-shift rotation. The tillage was insufficient, and made still worse by the commencement of severe drought before the last ploughing was completed, which was thereby rendered very laborious, and imperfect withal. The drought continued through all August, and greatly injured the whole crop of corn.

Results continued. October 22d. Marked off by a chain half an acre within the space A (8 by 10 poles) as much in D, and a quarter acre (10 by 4 poles) in each of the other three sides C, B, and E—having each of the last four spaces as near as could be to the outlines of the space A. The products carefully measured, (in the ears) yielded as follows:

	B.	P.
A, not marled, yielded 6	$0\frac{1}{4}$	of grain, to the acre.
D marled, ...	19	$3\frac{1}{2}$
E do.	20	1
C do.	20	2
B do.	20	$1\frac{1}{2}$

In comparing these products with those of the same land in 1831, stated above, it should be remembered that the corn formerly measured was dry, while that of the last measurement had yet to lose greatly by shrinking. As after early gathering, the corn from the poorest land of course will lose most by drying, and as the ears on A were generally very defective and badly filled, if the measurement had been made in the sound and well dried grain of each parcel, the product of A could not have exceeded one-fourth of that of the surrounding marled land.

But though these differences of product present the improvement caused by marling in a striking point of view, this close and stubborn soil at best is very unfit for the corn crop—and its highest value is found under clover, and in wheat on clover, of which some proofs will be found in the next experiment.

Experiment 7.

Another piece of land of twenty-five acres, of soil and qualities similar to the last described (Exp. 5 and 6,) was cleared in 1818, and about six acres marled in 1819, at about three hundred and fifty bushels. The course of cultivation was as follows.

1820—Corn—benefit from marl very unequal—supposed to vary between twenty-five and eighty per cent.

1821. Wheat—the benefit derived greater.

1822. At rest.

1823. Ploughed early for corn, but not planted. The whole marled at the rate of six hundred bushels ($\frac{1}{8}$ of an acre,) again ploughed in August, and sowed in wheat in October. The old marled space, more lightly covered, so as to make the whole nearly equal.

1824. The wheat much improved.

1825 and 1826—at rest.

1827. Corn.

1828. In wheat, and sowed in clover.

1829—The crop of clover was heavier than any I had ever seen in this part of the country, except on rich natural soil, where gypsum was used, and acted well. The growth was thick, but unequal in height, (owing probably to unequal spreading of the marl,)—it stood from fifteen to twenty-four inches high. The first growth was mowed for hay, and the second left to improve the land.

1830. The clover not mowed. Fallowed in August, and sowed wheat in October, after a second ploughing.

1831. The wheat was excellent—almost heavy enough to be in danger of lodging. I supposed the product to be certainly twenty bushels—perhaps twenty-five, to the acre.

As it had not been designed to make any experiment on this land, the progress of improvement was not observed with much care. But whatever were the intermediate steps, it is certain that the land, at first, was as poor as that forming the subjects of the two preceding experiments in the unimproved state, (the measured products of which have been given)—and that its last crop was three or four times as great as could have been obtained, if marl had not been applied. The peculiar fitness of this kind of soil for clover after marling, will require further remarks, and will be again referred to hereafter.

CHAPTER XI.

THE EFFECTS OF CALCAREOUS MANURES, ON
ACID SOILS REDUCED BY CULTIVATION.PROPOSITION 5. *Continued.*

My use of fossil shells has been more extensive on impoverished acid soils, than on all other kinds, and has never failed to produce striking improvement. Yet it has unfortunately happened, that the two experiments made on such land with most care, and on which I relied mainly for evidence of the durable and increasing benefit from this manure, have had their effects almost destroyed, by the applications having been made too heavy. These experiments, like the 4th, and 6th, already reported, were designed to remain without any subsequent alteration, so that the measurement of their products once in every succeeding rotation, might exhibit the progress of improvement under all the different circumstances. As no danger was then feared from such a cause, marl was applied heavily, that no future addition might be required: and for this reason, I have to report my greatest disappointments exactly in those cases where the most evident success and increasing benefits had been expected. However, these failures will be stated as fully as the most successful results—and they may at least serve to warn from the danger, if not to show the greatest profits of marling.

It should be observed that the general rotation of crops pursued on the farm, on all land not recently cleared, was that of four shifts, (corn, wheat, and then the land two years at rest and not grazed,) though some exceptions to this course will be remarked in some of the experiments.

Experiment 8.

Of a poor silicious acid loam, seven acres were marled at the rate of only ninety bushels ($\frac{3}{10}$) to the acre: laid on and spread early in 1819.

Results. 1819. In corn—the benefit too small to be generally perceptible, but could be plainly distinguished along part of the outline, by comparing with the part not marled.

1820. Wheat—something better—and the effect continued to be visible on the weeds following, until the whole was more heavily marled in 1823.

Experiment 9.

In the same field, on soil as poor and more sandy than the last described, four acres were marled at one hundred and eighty bushels ($\frac{3}{10}$) March 1819. A part of the same was also covered heavily with rotted barn-yard manure, which also extended through similar land not marled. This furnished for observation, land marled only—manured only—marled and manured—and some without either. The whole space, and more adjoining, had been manured five or six years before by summer cow-pens, and stable litter—of which no appearance remained after two years.

Results. 1819. In corn. The improvement from marl very evident—but not to be distinguished on the part covered also by manure, the effect of the latter so far exceeding that of the marl.

1820. In wheat. 1821 and 1822, at rest.

1823. In corn— $5\frac{1}{2}$ by $3\frac{1}{2}$ feet—The following measurements were made on adjoining spaces on

October 10th. The shape of the ground did not admit of larger pieces, equal in all respects, being measured, as no comparison of products had been contemplated at first, otherwise than by the eye.

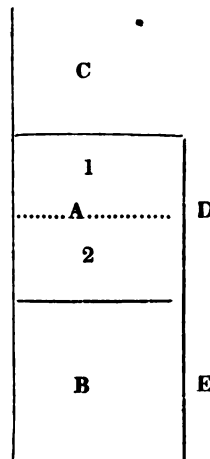
Bush. Qts.

From the part not marled—			
414	corn-hills made 75 quarts--or per acre,	13	26
Marled only—			
414	100	18	12
Manured only—			
490	105	15	5
Marled and manured—			
490	130	20	20

The growth on the part both marled and manured was evidently inferior to that of 1819: this was to be expected, as this small quantity of calcareous earth was not enough to fix half so much putrescent manure—and of course, the excess was as liable to waste as if no marl had been used.

Experiment 10.

Twenty acres of sandy loam, on a sandy sub-soil, covered in 1819 with marl of about $\frac{3}{10}$ average proportion of calcareous earth, and the balance silicious sand—at eight hundred bushels to the acre. This land had been long cleared, and much exhausted by cultivation: since 1813 not grazed, and had been in corn only once in four years, and as it was not worth sowing in wheat, had three years in each rotation to rest and improve by receiving all its scanty growth of weeds. The same course has been continued since 1819, except that wheat has regularly followed the crops of corn, leaving two years of rest, in four. This soil was lighter than the subject of any preceding experiment, except the ninth. On a high level part, surrounded by land apparently equal, a square of about an acre (A) was staked off, and left without marl—which that year's work brought to two sides of the square (C and D.)



Results. 1820. In corn: October 13th, three half acres of marled land were measured, and as many on that not marled, and close adjoining, and produced as follows:—

Not marled.			Marled.		
Bush. Pecks.			Bush. Pecks.		
Half acre in A,	7	1	adjoining in C,	12	3
The same in A,	7	1	 D,	13	3½
Half acre in B,	7	2½	 E,	15	0½

The average increase being 12½ bushels of grain to the acre: nearly 100 per cent. as measured, and more than 100, if the defective filling, and less matured state of the corn not marled, be considered. The whole would have lost more by shrinkage than is usual from equal products.

1821. The whole in wheat—much hurt by the wetness of the season. The marled part more than twice as good as that left out.

1822 and 1823. At rest. A good cover of carrot weeds and other kinds had succeeded the former growth of poverty grass and sorrel, and every appearance promised additional increase to the next cultivated crop. Nov. 1823, when the next ploughing was commenced, the soil was found to be evidently deeper, of a darker color, and firmer, yet more friable. The two-horse ploughs with difficulty (increased by the cover of weeds,) could cut the required depth of five inches, and the slice crumbled as it fell from the mould-board. But as the furrows passed into the part not marled, an immediate change was seen, and even *felt* by the ploughman, as the cutting was so much more easy, that care was necessary to prevent the plough running too deep—and the slices turned over in flakes, smooth and sleek from the mould-board, like land too wet for ploughing, which however was not the case. The marling of the field was completed, at the same rate, (eight hundred bushels,) which closed a third side (B) of the

marked square. The fourth side was my neighbor's field.

1824. In corn. The newly marled part showed as early and as great benefit as was found in 1820—but was very inferior to the old, until the latter was ten or twelve inches high, when it began to give evidence of the fatal effects of using this manure too heavily. The disease thus produced became worse and worse, until many of the plants had been killed, and still more were so stunted, as to leave no hope of their being otherwise than barren. The effects will be known from the measurements, which were made nearly on the same ground as the corresponding marks in 1820, and will be exhibited in the table, together with the products of the succeeding rotations.—Besides the general injury suffered here in 1824, there were one hundred and three corn hills in one of the measured quarter acres (in C) or more than one-sixth, entirely barren, and eighty-nine corn hills in another quarter acre (D.) In counting these, none of the missing hills were included, as these plants might have perished from other causes. This unlooked for disaster diminished the previous increase gained by marling, by nearly one-half; and the damage has since been still greater, at each successive return of cultivation.

Just before planting the crops of 1832, straw and chaff very imperfectly rotted by exposure, and which contained no admixture of animal manure, were applied at the rate of 800 bushels the acre to half the square without marl (A 1) and to all the surrounding marled land. The vegetable manure showed but slight benefit, until after all the worst effects of excessive marling had been produced; and the later operation of the manure served barely to prevent a still farther diminution being exhibited by the land injured by marl.

MARK	DESCRIPTION.	PRODUCT IN SHELLED CORN, PER ACRE.			
		1st course 1820 Oct. 13.	2nd course 1824 Oct. 16.	3d course 1828 Oct. 13.	4th course 1832 Oct. 19.
		Bush. pecks.	Bush. pecks.	Bush. pecks.	Bush. pecks.
A	Not marled,	14 2	16 1	11 3½	9 3
A 1	After manuring,				16 3
B	Not marled until 1823,	15 1	28	19 2	not measured.
C	Marled in 1819—manured with chaff &c. in 1832,	25	19 2	15	18
D		27 3½	20	19	19 ½
E		30 1	not measured.	not measured.	not measured.

The crops of wheat were less injured than the corn.

For the crops of 1828, ploughed with three mules to each plough, from six to seven inches deep—seldom turning up any subsoil (which was formerly within three inches of the surface,) and the soil appearing still darker and richer than when preparing for the crops of 1824. The ploughing of the square not marled (A) no where exceeded six inches: yet that depth must have injured the land, as I can impute to no other cause the remarkable diminution of product, through four courses of the mild four-shift rotation. It was evident that a still greater depth of furrow was not hurtful to the marled land. A strip across the field in another place, was in 1828 ploughed eight inches deep for experiment, by the side of another of four inches, and the corn on the deepest plough-

ing was the best. Another was trench-ploughed twelve inches deep, without showing any perceptible difference either of product, or in the effects of damage from the excess of marl.

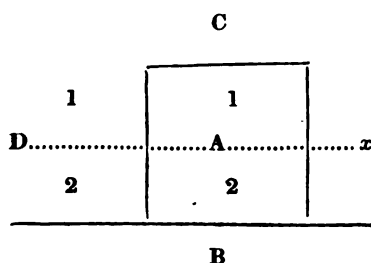
This square left without marl is the land formerly referred to (page 13) as showing a diminished product through three successive courses of the rotation recommended by the author of *Arator* as enriching. Since, another crop has been made and measured, and found to be still smaller than any previous. To whatever cause this continued falling off for 16 years may be attributed, it is at least a remarkable contradiction to the power of vegetable matter alone making poor land rich.

Much trouble has been encountered in attending to this experiment, and much loss of product submitted to, since its commencement, for the purpose of knowing the progress and extent of the

evil caused by the excess of marl. But another portion of the field, marled as heavily in 1824, and where equal damage was expected to ensue, has been entirely relieved by intermitting the corn crop of 1828, sowing clover, which (by using gypsum) produced well, and which was left to full and rot on the land. The next growth of corn (1832) was free from disease, and though irregular, seemed to the eye to amount to full twenty-five bushels to the acre.

Experiment 11.

The ground on which this experiment was made, was in the midst of nineteen or twenty acres of soil apparently similar in all respects—level, gray sandy loam, cleared about thirty years before, and reduced as low by cultivation as such soil could well be. The land that was marled and measured was about two hundred yards distant from Experiment 2, and both places are supposed to have been originally similar in all respects. This land had not been cultivated since 1815, when it was in corn—but had been once ploughed since, in Nov. 1817, which had prevented broom grass from taking possession. The ploughing then was four inches deep, and in five and a half feet beds, as recommended in *Arator*. The growth in the year 1820, presented but little except poverty grass, running blackberry, and sorrel—and the land seemed very little if at all improved by its five successive years of rest. A small part of this land was covered with calcareous sand $\frac{2}{3}$ —quantity not observed particularly, but probably about six hundred bushels.



Results. 1821—Ploughed level, and planted in corn—distance $5\frac{1}{2}$ by $3\frac{1}{2}$ feet. The measurement of spaces nearly adjoining, made in October, was as follows:

23 by 25 corn hills, not marled, (A)	} very nearly.
made $2\frac{1}{2}$ bushels, or per	
acre, - - - - - $8\frac{3}{4}$	
23 by 25 corn hills, marled, (B) $5\frac{1}{2}$ $22\frac{1}{2}$	

1822. At rest. Marled the whole, except a marked square of fifty yards, containing the space measured the preceding year. Marl $\frac{1}{2}$, and finely divided—three hundred and fifty bushels to the acre—from the same bed as that used for Experiment 4. In August, ploughed the land, and sowed wheat early in October.

1823. Much injury sustained by the wheat from Hessian fly, and the growth was not only mean, but very irregular—but it was supposed that the first marled place was from fifty to one hundred per

cent. better than the last, and the last superior to the included square not marled, in as great a proportion.

1824. Again in corn. The effects of disease from marling were as injurious here, both on the new and old part, as those described in Experiment 10. No measurement of products made, owing to my absence when the corn was cut down for sowing wheat.

1825. The injury from disease less on the wheat, than on the corn of the last year on the latest marling, and none perceptible on the oldest application. This scourging rotation of three grain crops in four years, was particularly improper on marled land, and the more so on account of its poverty.

1826. White clover had been sown thickly over forty-five acres, including this part, on the wheat, in January 1825. In the spring of 1826, it formed a beautiful green though low cover to even the poorest of the marled land. Marked spots, which were so diseased by over-marling, as not to produce a grain of corn or wheat, produced clover at least as good as other places not injured by that cause. The square, which had been sowed in the same manner, and on which the plants came up well, had none remaining by April 1826, except on a few small spots, all of which together would not have made three feet square. The piece not marled, white with poverty grass, might be seen, and its outlines traced at some distance by its strong contrast with the surrounding dark weeds in winter, or the verdant turf of white clover the spring before.

1827. Still at rest. No grazing allowed on the white clover.

1828. In corn—the land broken in January, five inches deep. October 14th made the following measurements.

In the square not marled 105 by 104½ feet (thirty-six square yards more than a quarter of an acre,) made one barrel of ears—or of grain, to the acre,

	Bush. pecks.
	9 1½
The same in 1821,	8 1½
Gain,	1 0½

	Bush. pecks.
Old marling—105 by 104½ feet—2½ barrels,	22 2
The same in 1821,	22 0½
Gain,	1½

New marling, 105 by 104½ feet, on the side that seemed to be the most diseased, (D) 1½ barrels—or nearly twelve bushels to the acre.

1832. Again in corn. Since 1826, the four-shift rotation had been regularly adhered to. Ploughed early in winter five inches deep, and again with two-horse ploughs just before planting, and after manuring the land above the dotted line D x. The manure was from the stable yard, the vegetable part of it composed of straw, corn-stalks, corn-cobs, and leaves raked from woodland—had been heaped in a wet state a short time before, and was still hot from its fermentation when carrying to the field. It was then about half rotted. The

rate at which it was applied was about 807 heaped bushels to the acre, which was much too heavy for profit. The corn on the oldest marling (B) showed scarcely a trace of remaining damage, while that on D 2 was again much injured. On the manured part of D, and C, the symptoms of

disease began also to show early—but were so soon checked by the operation of the putrescent manure, that very little (if any) loss could have been sustained from that cause. The following table exhibits all the measured products for comparison.

MARK.	DESCRIPTION.	PRODUCT IN GRAIN PER ACRE.			
		1st course 1821 Oct.—	2nd course 1824	3d course 1828 Oct. 14.	4th course 1832 Oct. 20.
A	{ Not marled,	Bush. pecks.	None measured,	Bush. pecks.	Bush. pecks.
A 1	{ —————Manured in 1832,	8 1½	but the product of	9 1½	9 2½ }
C	{ Marled in 1822 and manured } in 1832,		B much reduced	the same	23 3 }
B	{ Marled in 1821,	22 0½	by excess of marl,		31 1½ }
D	{ Marled in 1822,		and D and C equal-	22 2	25 }
D 1	{ The same—& manured in 1832 }		ly injured from the	12	17 3 }
			same cause.	the same	34 3 }

The products of the spaces A and B, in 1828, were not only estimated as usual from the measurement of the corn in ears, (which estimated quantities are those in the table,) but they were also shelled on the day when gathered, and the grain then measured, and again some months after, when it had become thoroughly dry. Care was taken that there should be no waste of the corn, or other cause of inaccuracy. The result shows nearly double the loss from shrinking in the corn not marled, and of course a proportional gain in that marled, besides the increase which appears from the early measurement exhibited in the table. The grain of A, not marled, when first shelled, measured a very little more than the quantity fixed by estimate, and lost by shrinking 30 per cent. The marled grain, from B, measured at first above four per cent. more than the estimate—and after shrinking, fell below it so much as to show the loss to be 16 per cent.

The loss from shrinking in this case was more than usual, from the poverty and consequent backwardness of the part not marled, and the uncommonly large proportion of replanted corn on the whole.

The two last experiments, as well as the 4th, were especially designed to test the amount of increased product to be obtained from marling, and to show the regular addition to the first increase, which the theory promised at each renewal of tillage. As to the main objects, all the three experiments have proved failures—and from the same error of marling too heavily. Although for this reason, the results have shown so much of the injurious effects, still, taken altogether, the experiments prove clearly, not only the great immediate benefit of applying marl, but also its continued and increasing good effects, when applied in proper quantities.

Experiment 12.

On nine acres of sandy loam, marled in 1819 at four hundred bushels ($\frac{4}{10}$) nearly an acre was manured during the same summer, by penning cattle: with the expectation of preserving the manure, double the quantity of marl, eight hundred bushels in all, was laid on that part. The field in corn in 1820—in wheat, 1821—and at rest 1822 and 1823.

Results. 1824. In corn, the second rotation after marling. The effects of the dung has not much diminished, and that part shows no damage from the quantity of marl, though the surrounding corn, marled only half as thickly, gave signs of general, though very slight injury from that cause.

Experiment 13.

Nearly two acres of loamy sand, was covered with farm-yard manure, and marl ($\frac{4}{10}$) at the same time, in the spring of 1822, and tended in corn the same year, followed by wheat. The quantity of marl not remembered—but it must have been heavy (say not less than six hundred bushels to the acre) as it was put on to fix and retain the manure, and I had then no fear of damage from heavy dressings.

Result. 1825. Again in corn—and except on a small spot of sand almost pure, no signs of disease from over-marling.

CHAPTER XII.

EFFECTS OF CALCREOUS MANURES ON "FREE LIGHT LAND."

Experiment 14.

The soil known in this part of the country by the name of "free light land" has so peculiar a character, that it deserves a particular notice. It belongs to the slopes and waving lands, between the ridges and the water courses, but has nothing of the durability which slopes of medium fertility sometimes possess. In its woodland state it would be called rich, and may remain productive for a few crops after clearing—but it is rapidly exhausted, and when poor, seems as unimprovable by vegetable manures as the poorest ridge lands. In its virgin state, this soil might be supposed to deserve the name of neutral—but its productive power is so fleeting, and acid growths and qualities so surely follow its exhaustion, that it must be inferred that it is truly an acid soil.

The subject of this experiment presents soil of this kind with its peculiar characters unusually

well marked. It is a loamy sandy soil (the sand coarse) on a similar subsoil of considerable depth. The surface waving—almost hilly in some parts. The original growth principally red oak, hickory, and dogwood—not many pines, and very little whortleberry. Cut down in 1816 and put in corn the next year. The crop was supposed to be twenty-five bushels to the acre. Wheat succeeded, and was still a better crop for so sandy a soil—making twelve to fifteen bushels, as it appeared standing. After a year of rest, and not grazed, the next corn crop of 1820, was evidently considerably inferior to the first—and the wheat of 1821, (which however was a very bad crop from too wet a season) could not have been more than five bushels to the acre. In January 1820, a piece of $1\frac{1}{2}$ acres was limed, at one hundred bushels the acre. The lime being caught by rain before it was spread, formed small lumps of mortar on the land, and produced no benefit on the corn of that year, but could be seen slightly in the wheat of 1821. The land again at rest in 1822 and 23, when it was marled, at six hundred bushels, ($\frac{3}{4}$ of a ton) without omitting the limed piece—and all sowed in wheat that fall. In 1824, the wheat was found to be improved by the marl, but neither that, nor the next of 1828, was equal to its earliest product of wheat. The limed part showed injury from the quantity of manure in 1824, but none since. The field was now under the regular four-shift rotation, and continued to recover—but did not surpass its first crop until 1831, when it brought rather more than thirty bushels of corn to the acre—being five or six more than its supposed first crop.

Adjoining this piece, six acres of similar soil were grubbed and belted in August 1826—marl at six hundred to seven hundred bushels ($\frac{3}{4}$ of a ton) spread just before. But few of the trees died until the summer of 1827. 1828, planted in corn: the crop did not appear heavier than would have been expected if no marl had been applied—but no part had been left without, for comparison. 1829—wheat. 1830, at rest. 1831, in corn, and the product supposed to be near or quite thirty-five bushels—or an increase of thirty-five or forty per cent. on the first crop. No measurement was made—but the product was estimated by comparison with an adjacent piece, which measured thirty-one bushels, and which seemed to be inferior to this piece.

The operation of marl on this kind of soil, seems to add to the previous product very slowly, compared with other soils—but it is not the less effectual and profitable, in fixing and retaining the vegetable matter accumulated by nature, which otherwise would be quickly dissipated by cultivation, and lost forever.

The remarkable open texture of the soil on which the last two experiments were tried will be evident from the following statement of the quantity and coarseness of the silicious sand contained.

1000 grains of this soil, taken in 1826 from the part that had been both limed and marled, was found to consist of
811 of silicious sand moderately coarse, mixed with a few grains of coarse shelly matter.
158—finely divided earthy matter, &c.
31—loss.

1000

At the same time, from the edge of the adjoining woodland which formed the next described clearing, and which had not then been marled, a specimen of soil was taken from between the depths of one and three inches—and found to consist of the following proportions. This spot was believed to be rather lighter than the other in its natural state.

865 grains of silicious sand, principally coarse—
107—finely divided earthy matter, &c.
28—loss.

1000

CHAPTER XIII.

EFFECTS OF CALCAREOUS MANURES ON EXHAUSTED ACID SOILS, UNDER THEIR SECOND GROWTH OF TREES.

PROPOSITION 5. *Continued.*

Not having owned much land under a second growth of pines, I can only refer to two experiments of this kind. The improvement in both these cases has been so remarkable, as to induce the belief that the old fields to be found on every farm, which have been exhausted and turned out of cultivation thirty or forty years, offer the most profitable subjects for the application of calcareous manures.

Experiment 15.

May 1826. Marled about eight acres of land under its second growth, by opening paths for the carts, ten yards apart. Marl $\frac{3}{4}$ of a ton, put five hundred to six hundred bushels to the acre—and spread in the course of the summer. In August, belted slightly all the pines that were as much as eight inches through, and cut down or grubbed the smaller growth, of which there was very little. The pines (which were the only trees,) stood thick, and were mostly from eight to twelve inches in diameter—eighteen inches where standing thin. The land joined Exp. 14 on one side—but this is level, and on the other side joins ridge woodland, which soon becomes like the soil of Exp. 1. This piece, in its virgin state, was probably of a nature between those two soils—but more like the ridge soil, than the “free light land.” No information has been obtained as to the state of this land when its former cultivation was abandoned. The soil, (that is, the depth which has since been turned by the plough,) a whitish loamy sand, on a subsoil of the same: in fact, all was subsoil before ploughing, except half an inch or three quarters, on the top, which was principally composed of rotted pine leaves. Above this thin layer, were the later dropped and unrotted leaves, lying loosely several inches thick.

The pines showed no symptom of being killed, until the autumn of 1827, when their leaves began to have a tinge of yellow. To suit the cultivation with the surrounding land, this piece was laid down in wheat for its first crop, in October 1827. For this purpose the few logs, the boughs, and grubbed bushes were heaped, but not burnt—the

grain sowed on the coat of pine leaves, and ploughed in by two-horse ploughs, in as slovenly a manner as may be supposed from the condition of the land—and a wooden-tooth harrow then passed over, to pull down the heaps of leaves, and roughest furrows.

Results. The wheat was thin, but otherwise looked well while young. The surface was again soon covered by the leaves dropping from the now dying trees. On April 2d 1828, most of the trees were nearly dead, though but few of them entirely. The wheat was then taller than any in my crop—and when ripe, was a surprising growth for such land, and such tillage.

1829 and 1830. At rest. Late in the spring of 1830 an accidental fire passed over the land—but the then growing vegetation prevented all of the older cover being burnt, though some was destroyed every where.

1831. In corn. The growth excited the admiration of all who saw it, and no one estimated the product so low as it actually proved to be. A square of four (two pole) chains, or four-tenths of an acre, measured on November 25th, yielded at the rate of thirty-one and three-eighths bushels of grain to the acre.

Experiment 16.

In a field of acid sandy loam, long under the usual cultivation, a piece of five or six acres was covered by a second growth of pines thirty-nine years old, as supposed from that number of rings being counted on some of the stumps. The largest trees were eighteen or twenty inches through. This ground was altogether on the side of a slope, steep enough to lose soil by washing, and more than one old shallow gully remained to confirm the belief of the injury that had been formerly sustained from that cause. These circumstances, added to all the surrounding land having been continued under cultivation, made it evident that this piece had been turned out of cultivation because greatly injured by tillage. It was again cut down in the winter of 1824-5—many of the trees furnished fence rails, and fuel—and the remaining bodies were heaped and burnt some months after, as well as the large brush. In August it was marled, supposed at six hundred bushels ($\frac{3}{4}$)—twice coultured in August and September, and sowed in wheat—the seed covered by trowel ploughs. The leaves and much of the smaller brush left on the ground, made the ploughing troublesome and imperfect. The crop (1826) was remarkably good—and still better were the crops of corn and wheat in the ensuing rotation, after two years of rest. On the last crop of wheat (1830) clover was sowed—and mowed for hay in 1831. The growth stood about eighteen inches high, and never have I seen so heavy a crop on sandy and acid soil, even from the heaviest dunging, the utmost care, and the most favorable season. The clover grew well in the bottoms of the old gullies, which are still plainly to be seen, and which no means had been used to improve, except such as all the land had received. Within two feet of the surface the subsoil of this land is of clay, which probably helped its growth of clover.

CHAPTER XIV.

EFFECTS OF CALCAREOUS MANURES ALONE, OR WITH GYPSUM, ON NEUTRAL SOILS.

PROPOSITION 5. *Continued.*

Applications of calcareous earth alone, to calcareous soils, are so manifestly useless, that only two experiments of that kind have been made, neither of which has had any improving effect that could be observed, in the twelve years that have since elapsed.

When calcareous manures have been applied to neutral soils, whether new or worn, no perceptible benefit has been obtained on the earliest crops. The subsequent improvement has gradually increased as would be expected from the power of fixing manures, attributed to calcareous earth. But however satisfactory these general results are to myself, they are not such as could be reported in detail, with any advantage to other persons. It is sufficiently difficult to make fair and accurate experiments, where early and remarkable results are expected. But no cultivator of a farm can bestow enough care and patient observation, to obtain true results from experiments that scarcely will show their first feeble effects in several years after the commencement. On a mere experimental farm, such things may be possible—but not where the main object of the farmer is profit from his general and varied operations. The effects of changes of season, of crops, of the mode of tillage—the auxiliary effects of other manures—and many other circumstances, would serve to defeat any observations of the progress of a slow improvement, though the ultimate result of the general practice might be abundantly evident.

Another cause of being unable to state with any precision the practical benefit of marling neutral soils, arises from the circumstance that nearly all the calcareous manure thus applied, has been accompanied by a natural admixture of gypsum: and though I feel confident in ascribing some effects to one, and some to the other of these two kinds of manure, yet this division of operation must rest merely on opinion, and cannot be received as certain, by any other than him who makes and carefully observes the experiments. Some of these applications will be described, that other persons may draw their own conclusions from them.

The cause of these manures being applied in conjunction was this. A singular bed of marl lying under Coggin's Point, and the only one within a convenient distance to most of the neutral soil, contains a very small proportion (perhaps about one per cent.) of gypsum, scattered irregularly through the mass, seldom visible, though sometimes to be met with in small crystals. The calcareous ingredient is generally about $\frac{3}{4}$ —sometimes $\frac{5}{8}$. If this manure had been used before its gypseous quality was discovered, all its effects would have been ascribed to calcareous earth alone, and the most erroneous opinions might thence have been formed of its mode of operation.

What led me to suspect the presence of gypsum in this bed of fossil shells, was the circumstance that throughout its whole extent of near a mile along the river bank, this bed lies on another earth, of peculiar character and appearance, and which, in many places, exhibits gypsum in crystals of

various sizes. This earth has evidently once been a bed of fossil shells, like what still remains above—but nothing now is left of the shells, except numerous impressions of their forms. Not the smallest proportion of calcareous earth can be found—and the gypsum into which it must have been changed (by meeting with sulphuric acid, or sulphuret of iron,) has also disappeared in most places; and in others, remains only in small quantities—say from the smallest perceptible proportion, to fifteen or twenty per cent. of the mixed mass. In some rare cases, this gypseous earth is sufficiently abundant to be used profitably as manure, as has been done, by Mr. Thomas Cocke of Tarrybay, as well as myself. It is found in the greatest quantity, and also the richest in gypsum, at Evergreen, two miles below City Point. There the gypsum frequently forms large crystals of varied and beautiful forms. The distance that this bed of gypseous earth extends is about seven miles, interrupted only by some bodies of lower land, apparently of a more recent formation by alluvion.

In the bed of gypseous marl above described, there are regular layers of a calcareous rock, which was too hard to use profitably for manure, and which caused the greatest impediment to obtaining the softer part. This rock contains between eighty-five and ninety per cent. of pure calcareous earth, besides a little gypsum and iron. It makes excellent lime for cement, mixed with twice its bulk of sand—and has been used for part of the brickwork, and all the plastering of my present dwelling house, and for several of my neighbors' houses. The whole body of marl also contains a minute proportion of some soluble salts, which possibly may have some influence on the operation of the substance, as manure, or cement.

Thus, from the examination of a single body of marl, there have been obtained not only a rich calcareous manure, but also gypsum, and a valuable cement. Similar formations may perhaps be abundant elsewhere, and their value unsuspected, and likely to remain useless. This particular body of marl has no outward appearance of possessing even its calcareous character. It would be considered, on slight observation, as a mass of gritty clay, of no worth whatever. [Appendix H.]

This gypseous marl has been used on fifty-six acres, most of which was neutral soil—and generally, if not universally, with early as well as permanent benefits. The following experiments show results more striking than have been usually obtained, but all agree in their general character.

Experiment 17.

1819. Across the shelly island numbered 3, in the examinations of soils, (page 19,) but where the land was less calcareous, a strip of three quarters of an acre was covered with muscle-shell marl. Touching this through its whole length, another strip was covered with gypseous marl, ($\frac{2}{3}$) at the rate of two hundred and fifty bushels.

Results. 1819. In corn. No perceptible effect from the muscle shells. The gypseous marling considerably better than on either side of it.

1820. Wheat—less difference.

1821. Grazed. Natural growth of white clover thickly set on the gypseous marling, much thinner on the muscle-shells, and still less of it where no marl had been applied.

The whole field afterwards was put in wheat on summer fallow every second year, and grazed the intervening year—a course very unfavorable for observing, or permitting to take place, any effects of gypsum. Nothing more was noted of this experiment until 1825, when cattle were not turned in until the clover reached its full size. The strip covered with gypseous marl showed a remarkable superiority over the other marled piece, as well as the land which was still more calcareous by nature, and which had produced better in 1826. In several places, the white clover stood thickly a foot in height.

Experiment 18.

A strip of a quarter acre passing through rich black neutral loam, covered with gypseous marl at two hundred and fifty bushels.

Results. 1818. In corn. By July, the marled part seemed the best by fifty per cent., but afterwards the other land gained on it, and little or no difference was apparent, when the crop was matured.

1819. Wheat—no difference.

1820 and 1821. At rest. In the last summer the marled strip could again be easily traced, by the entire absence of sorrel, (which had been gradually increasing on this land since it had been secured from grazing,) and still more by its very luxuriant growth of bird-foot clover, which was thrice as good as that on the adjoining ground.

Experiment 19.

1822. On a body of neutral soil which had been reduced quite low, but was well manured in 1819 when last cultivated, gypseous marl was spread on nine acres, at the rate of three hundred bushels. This terminated on one side at a strip of muscle-shell marl ten yards wide—its rate not remembered, but it was certainly thicker in proportion to the calcareous earth contained, than the other, which I always avoided laying on heavily, for fear of causing injury by too much gypsum. The line of division between the two marls, was through a clay loam. The subsoil was a retentive clay, which caused the rain water to keep the land very wet through the winter, and early part of spring.

Results. 1822. In corn, followed by wheat in 1823: not particularly noticed—but the benefits must have been very inconsiderable. All the muscle-shell marling, and four acres of the gypseous, sowed in red clover, which stood well, but was severely checked, and much of it killed, by a drought in June, when the sheltering wheat was reaped. During the next winter (by neglect) my horses had frequent access to this piece, and by their trampling in its wet state, must have injured both land and clover. From these disasters the clover recovered surprisingly; and in 1824, two mowings were obtained, which though not heavy, were better than from any of my previous attempts to raise this grass. In 1825, the growth was still better, and yielded more to the scythe. This was the first time that I had seen clover worth mowing on the third year after sowing—and had never heard of its being comparable to the second year's growth any where in the lower country. The growth on the muscle-shell marling was very inferior to the

other, and was not mowed at all the last year, being thin and low, and almost eaten out by wire grass.

1826. In corn—and it was remarkable that the difference shown the last year was reversed, the muscle-shell marling now having much the best crop.

In these and other applications to neutral soils, I ascribe the earliest effects entirely to gypsum, as well as the peculiar benefit shown to clover, throughout. The later effects on grain, are due to the calcareous earth in the manure.

Another opinion was formed from the effects of gypseous marl, which may lead to profits much more important than any to be derived from the limited use of this, or any similar mineral compound—viz: *that gypsum may be profitably used after calcareous manures, on soils on which it was totally inefficient before.* I do not present this as an established fact, of universal application—for the results of some of my own experiments are directly in opposition. But however it may be opposed by some facts, the greater weight of evidence furnished by my experiments and observations, decidedly supports this opinion. If correct, its importance to our low country is inferior only to the value of calcareous manures—which value, may be almost doubled, if the land is thereby fitted to receive the wonderful benefits of gypsum and clover.

It is well known that gypsum has failed entirely as a manure on nearly all the land on which it has been tried in the tide-water district—and we may learn from various publications, that as little general success has been met with along the Atlantic coast, as far north as Long Island. To account for this general failure of a manure so efficacious elsewhere, some one offered a reason, which was received without examination, and which is still considered by many as sufficient, viz. that the influence of salt vapors destroyed the power of gypsum on and near the sea coast. But the same general worthlessness of that manure extends one hundred miles higher than the salt water of the rivers—and the lands where it is profitably used, are much more exposed to sea air. Such are the rich neutral soils of Curle's Neck, Shirley, Berkley, Brandon, and Sandy Point on James River, on all which gypsum on clover has been extensively and profitably used. On acid soils, I have never heard of enough benefit being obtained from gypsum to induce the cultivator to extend its use further than making a few small experiments. When any effect has been produced on an acid soil, (so far as instructed by my own experience, or the information of others,) it has been caused by applying to small spaces, comparatively large quantities—and even then, the effects were neither considerable, durable nor profitable. Such have been the results of many small experiments made on my own acid soils—and very rarely was the least perceptible effect produced. Yet on some of the same soils, after marling, the most evident benefits have been obtained from gypsum on clover. The soils on which the 1st and 10th experiments were made, (at some distance from the measurements,) had both been tried with gypsum, and at different rates of thickness, before marling, without the least effect. Several years after both had been marled, gypseous earth (from the bed described pp. 48, 49,) was spread at twenty bushels the acre, (which

gave four bushels of pure gypsum,) on clover, and produced in some parts, a growth I have never seen surpassed. It is proper to state that such results have been produced only by heavy dressings. Mr. Thomas Cocke of Tarbay has this last spring (1831) sowed nearly four tons of Nova Scotia gypsum on clover on marled land, a continuation of the same ridge that my 1st, 2d, 3d, and 4th experiments were made on, and very similar soil. His dressing, at a bushel to the acre, before the summer had passed, produced evident benefit, where it is absolutely certain that none could have been obtained before marling.

On soils naturally calcareous, I have in some experiments greatly promoted the growth of corn, by gypsum, and have doubled the growth of clover on my best land of that kind. When the marl containing gypsum was applied, benefit from that ingredient was almost certain to be obtained.

All these facts, if presented alone, would seem to prove clearly the correctness of the opinion, that the acidity of our soils caused the inefficacy of gypsum, and that the application of calcareous earth, which will remove the former, will also serve to bring the latter into useful operation. But this most desirable conclusion is opposed by the results of other experiments, which though fewer in number, are as strong as any of the facts that favor that conclusion. If the subject was properly investigated, those facts, apparently in opposition, might be explained so as no longer to contradict this opinion—perhaps even help to confirm it. Good reasons, deduced from established chemical truths, may be offered to explain why the acidity of our soils should prevent the operation of gypsum: but it may be deemed premature to attempt the explanation of any supposed fact, before every doubt of its existence has been first removed. This subject well deserves a more full investigation from those who can be aided by more information, whether practical or scientific. [Appendix I.]

One of the circumstances will be mentioned, which appears most strongly opposed to the opinion which has been advanced. On the poor acid clay soil, of such peculiar and base qualities, which forms the subject of the 5th, 6th, and 7th experiments, gypsum has been sufficiently tried, and has produced not the least benefit, either before marling, or afterwards. Yet the growth of clover on this land after marling, is fully equal to what might be expected from the best operation of gypsum. Now if it could be ascertained that a very small proportion of either *sulphuric acid*, or of the *sulphate of iron* exists in this soil, it would completely explain away this opposing fact, and make it the strongest support of my position. The sulphate of iron has sometimes been found in arable soil,* and sulphuric acid has been detected in certain clays.† I have seen, on the same farm, a clay of very similar appearance to this soil, which had once contained one of these substances, as was proved by the formation of crystallized sulphate of lime, where the clay came in contact with calcareous earth. The sulphate of lime was found in the small fissures of the clay, extending sometimes one or two feet distant from the calcareous earth below. Precisely the same chemical

*Ag. Chem. p 141.

†Kirwan on Manures,

change would take place in a soil containing sulphuric acid, or sulphate of iron, as soon as marl was applied. The sulphuric acid, (whether free or combined with iron) would immediately unite with the lime presented, and form gypsum, (sulphate of lime.) Proportions of these substances too small perhaps to be detected by analysis, would be sufficient to form three or four bushels of gypsum to the acre—more than enough to produce the greatest effect on clover—and to prevent any benefit being derived from a subsequent application of gypsum.

Since the publication of the foregoing part of this chapter, in the first edition, my use of gypsum, on land formerly acid, has been more extended, and the results have been such as to give additional confidence in the practice, and, indeed, an assurance of good profit, on the average of such applications. But still, as before, disappointments either total or nearly so, in the effect of such applications, have sometimes occurred, and without there being any apparent cause to which to attribute such disappointment in the results.

In 1832, nine acres of the same body of ridge land above referred to, adjoining the piece on which the 1st, 2nd, 3rd and 4th experiments were made, and more lately cleared, were sowed in clover in the early part of 1831, on wheat. The next spring, French plaster was sowed at the rate of a bushel to the acre, except on four marked adjoining squares, each about one-third of an acre, one of which was left without plaster, and the others received it at the several rates of 2, 3, and 4 bushels to the acre. The whole brought a middling crop, and was mowed for hay, except the square left without gypsum, which did not produce more than half as much as the adjoining land where gypsum was applied at one bushel the acre. The product of the other pieces was slightly increased by each addition to the gypsum, but by no means in proportion to the increased quantity used: nor was the effect of the four bushels near equal to that formerly obtained, in several cases, from 20 bushels of gypseous earth taken from the river bank. Hence it seems, that it was not merely the unusual quantity of gypsum applied in this earth, which produced such remarkable benefit; and we must infer that it contains some other quality or ingredient capable of giving additional improvement to clover.

CHAPTER XV.

THE DAMAGE CAUSED BY CALCAREOUS MANURE, AND ITS REMEDIES.

PROPOSITION 5. *Continued.*

The injury or disease in grain crops produced by marling has so lately been presented to our notice, that the collection and comparison of many additional facts will be required before its cause can be satisfactorily explained. But the facts already ascertained will show how to avoid the danger in future, and to find remedies for the evils already inflicted by the injudicious use of calcareous manures.

The earliest effect of this kind observed, was in

May 1834, on the field containing experiment 10. The corn on the land marled four years before, sprang up and grew with all the vigor and luxuriance that was expected from the appearance of increased fertility exhibited by the soil, as before described, (page 44.) About the 20th of May the change commenced, and the worst symptoms of the disease were seen by the 11th of June. From having as deep a color as young corn shows on the richest soils, it became of a pale sickly green. The leaves, when closely examined, seemed almost transparent—afterwards were marked through their whole length by streaks of rusty red, separated very regularly by what was then more of yellow than green—and next they began to shrivel, and die downwards from their extremities. The growth of many of the plants was nearly stopped. Still some few showed no sign of injury, and maintained the vigorous growth which they began with, so as by contrast more strongly to mark the general loss sustained. The appearance of the field was such, that a stranger would have supposed that he saw the crop of a rich soil exposed to the worst ravages of some destructive kind of insect: but neither on the roots or stalks of the corn could any thing be found to support that opinion. Before the 1st of August, this gloomy prospect had improved. Most of the plants seemed to have been relieved of the infliction, and to grow again with renewed vigor. But before that time, many were dead, and it was impossible that the others could so fully recover as to produce any thing approaching a full crop for the land. It has been shown in the report of the products of Exp. 10, what diminution of crop was then sustained—and that the evil was not abated by the next cultivation. Still, neither of the diseased measured pieces has fallen as low as to its product before marling—nor do I think that such has been the result on any one acre on my farm, though many smaller spots have been rendered incapable of yielding a grain of corn or wheat.

The injury caused to wheat by marling is not so easy to describe, though abundantly evident to the observer. Its earliest growth, like that of corn, is not affected. About the time for heading, the plants most diseased appear as if they were scorched, and when ripe, will be found very deficient in grain. On very poor spots, from which nearly all the soil has been washed, sometimes fifty heads of wheat taken together would not furnish as many grains of wheat. This crop, however, suffers less than corn on the same land—perhaps because its growth is nearly completed by the time that the warm season begins, to which the ill effects of calcareous manures seem confined.

When these unpleasant discoveries were first made, two hundred and fifty acres had already been marled so heavily, that the same evil was to be expected to visit the whole. My labors thus bestowed for years had been greatly and unnecessarily increased—and the excess, worse than being thrown away, had served to take away that increase of crop, that lighter marling would have ensured. But though much and general injury was afterwards sustained from the previous work, yet it was lessened in extent and degree, and sometimes entirely avoided, by the remedial measures which were adopted. My observation and comparison of all the facts presented, led to the following conclusions, and pointed out the course

by which to avoid the recurrence of the evil, and the means to lessen or remove it, where it had already been inflicted.

1st. No injury has been sustained on any soil of my farm by marling not more heavily than two hundred and fifty heaped bushels to the acre, with marl of strength not exceeding $\frac{4}{100}$ of calcareous earth.

2d. Dressings twice as heavy seldom produce damage to the first crop on any soil—and never even on the after crops on any calcareous, or good neutral soil—nor on any acid soil supplied plentifully with vegetable matter.

3d. On acid soils marled too heavily, the injury is in proportion to the extent of one or all these circumstances of the soil—poverty, sandiness, and severe cropping and grazing, whether previously or subsequently.

4th. Clover, both red and white, will live and flourish on the spots most injured for grain crops, by marling too heavily. Thus, in the case before cited of land adjacent to the pieces measured in Exp. 10, and equally over-marled, very heavy red clover was raised in 1830, by adding gypsum, and which was succeeded by a good growth of corn, free from every mark of disease, in 1832.

5th. A good dressing of putrescent manure removes the disease completely, (see page 46.) All kinds of marl (or fossil shells) have sometimes been injurious—but such effects have been more generally experienced from the dry yellow marl, than from the blue and wet. It is possible that some unknown ingredient in the former may add to its hurtful power.

The inferences to be drawn from these facts are evident. They direct us to avoid injury, by applying marl lightly at first, and to be still more cautious according to the existence of the circumstances stated as increasing the tendency of marl to do harm. Next, if the over-dose has already been given, to forbid grazing entirely, and to furnish putrescent manure as far as possible—or to omit one or two grain crops, so as to allow more vegetable matter to be fixed in the land—to apply putrescent manures—and to sow clover as soon as circumstances permit. One or more of these remedies have been used on most of my too heavily marled land—and with considerable, though not always with entire success, because the means for the cure could not always be furnished at once in sufficient abundance. Other persons, who permitted close grazing, and adopted a more scourging rotation of crops, have suffered more damage, from lighter dressings of marl than mine.

But though the unlooked for damage sustained from this cause produced much loss and disappointment, and has greatly retarded the progress of my improvements, it did not stop my marling, nor abate my estimate of the value of the manure. If a cover of five hundred or six hundred bushels was so strong as to injure land of certain qualities, it seemed to be a fair deduction, that the benefit expected from so heavy a dressing, might have been obtained from half the quantity—if not on the first crop, at least on every one afterwards. That surely is nothing to be lamented. It also afforded some consolation for the evil of the too heavy marlings already applied, that the soil was thereby fitted to seize and retain a greater quantity of vegetable matter, and would thereby ultimately reach a higher degree of fertility.

The cause of this disease is less apparent than its remedies. It is certain that it is not produced merely by the quantity of calcareous earth in the soil. If it were so, similar effects would always be found on soils containing far greater proportions of that earth. Such effects are not known to any extent, except on soils formerly acid, and made calcareous artificially. The small spots of land that nature has made excessively calcareous and sandy (as the specimen 4, page 19,) produce a pale feeble growth of corn, such as might be expected from a poor gravel—but whether the plants yield grain, or are barren, they show none of those peculiar and strongly marked symptoms of disease which have been described.

By calculation, it appears that the heaviest dressing causing injurious consequences, mixed to the depth of five inches, has not given to the soil a proportion of calcareous earth equal to two per cent. This proportion is greatly exceeded in our best shelly land, and no such disease is found there, even when the rich mould is nearly all washed away, and the shells mostly left. Soils of remarkable fertility from the prairies of Alabama and Mississippi have been shown (page 22) to contain from 8 to 16 per cent. of calcareous earth, all of which proportions were in the state of most minute division, and therefore most ready to produce this disease, if it could have been produced by the quantity of this ingredient. Very fertile soils in France and England sometimes contain twenty or thirty per cent. of calcareous earth. Among the soils of remarkable good qualities analyzed by Davy, one is stated to contain about $\frac{20}{100}$, and another, which was eight-ninths of silicious sand, contained nearly $\frac{10}{100}$ of calcareous earth. Nor does he intimate that such proportions are very rare. Similar results have been stated, from analyses reported by Kirwan, Young, Bergman, and Rozier, (page 46,) and from all, the same deduction is inevitable, that much larger natural proportions of calcareous earth, than our diseased lands have received, are very common in France and England, without any such effect being produced.

From the numerous facts of which these are examples, it is certain that calcareous earth acting alone, or directly, has not caused this injury: and it seems most probable that the cause is some new combination of lime formed in acid soils only—and that this new combination is hurtful to grain under certain circumstances which we may avoid—and is highly beneficial to every kind of clover. Perhaps it is the *salt of lime*, formed by the calcareous manure with the acid of the soil, which not meeting with enough vegetable matter to combine with and fix in the soil, causes by its excess, all these injurious effects.

CHAPTER XVI.

RECAPITULATION OF THE EFFECTS OF CALCAREOUS MANURES, AND DIRECTIONS FOR THEIR MOST PROFITABLE APPLICATION.

PROPOSITION 5. Continued.

From the foregoing experiments may be gathered most of the effects, both injurious and

beneficial, to be expected from calcareous manures, on the several kinds of soils there described. Information obtained from statements in detail of agricultural experiments, is far more satisfactory to the attentive and laborious inquirer, than a mere report of the general opinions of the experimenter, derived from the results. But however preferable may be this mode of reporting facts, it is necessarily deficient in method, clearness, and conciseness. It may therefore be useful to bring together the general results of these experiments in a somewhat digested form, to serve as rules for practice. Other effects of calcareous manures will also be stated, which are equally established by experience, but which did not belong to any one accurately observed experiment.

The results that have been reported confirm in almost every particular the chemical powers before attributed to calcareous manures, by the theory of their action. It is admitted that causes and effects were not always proportioned—and that sometimes trivial apparent contradictions were presented. But this is inevitable, even with regard to the best established doctrines, and the most perfect processes in agriculture. There are many practices universally admitted to be beneficial—yet there are none, which are not found sometimes useless, or hurtful, on account of some other attendant circumstance, which was not expected, and perhaps not discovered. Every application of calcareous earth to soil, is a chemical operation on a great scale: decompositions and new combinations are produced, and in a manner generally conforming to the operator's expectations. But other and unknown agents may sometimes have a share in the process, and thus cause unlooked for results. Such differences between practice and theory have sometimes occurred in my use of calcareous manures (as may be observed in some of the reported experiments) but they have neither been frequent, uniform, nor important.

Under like circumstances in other respects, the benefit derived from marling will be in proportion to the quantity of vegetable or other putrescent matter given to the soil. It is essential that the cultivation should be mild, and that no grazing be permitted on poor lands. Wherever farm-yard manure is used, the land should be marled heavily, and if the marl is applied first so much the better. The one manure cannot act by fixing the other, except so far as they are in contact, and both well mixed with the soil.

On galled spots, from which all the soil has been washed, and where no plant can live, the application of marl alone is utterly useless. Putrescent manures alone would there have but little effect, unless in great quantity, and would soon be all lost. But marl and putrescent matter together serve to form a new soil, and thus both are brought into useful action: the marl is made active, and the putrescent manure permanent. The only perfect cures that I have been able to make, at one operation, of galls produced upon a barren subsoil, were by applying a heavy dressing of both calcareous and putrescent manures together: and this method may be relied on as certainly effectual. But though a fertile soil may thus be created, and fixed durably on galls otherwise irreclaimable, the cost will generally exceed the value of the land recovered, from the great quantity of putrescent matter required. Much of our acid hilly land,

has been deprived by washing of a considerable portion of its natural soil, though not yet made entirely barren. The foregoing remarks equally apply to this kind of land, to the extent that its soil has been carried off. It will be profitable to apply marl to such land—but its effect will be diminished, in proportion to the previous removal of the soil. Calcareous soils are much less apt to wash than other kinds, from the difference of texture. When a field that has been injured by washing is marled, within a few years after many of the old gulleys will begin to produce vegetation, and show a soil gradually forming from the dead vegetables brought there by winds and rains, although no means should have been used to aid this operation.

The effect of marling will be much lessened by the soil being kept under exhausting cultivation. Such were the circumstances under which we may suppose that marl was tried and abandoned many years ago, in the case referred to in page 37. Proceeding upon the false supposition that marl was to enrich by direct action, it is most probable that it was applied to some of the poorest and most exhausted land, for the purpose of giving the manure a "fair trial." The disappointment of such ill-founded expectations, was a sufficient reason for the experiment not being repeated, or being scarcely ever referred to again, except as evidence of the worthlessness of marl. Yet with proper views of the action of this manure, this experiment might at first, have as well proved the early efficacy and value of marl, as it now does its durability.

When acid soils are equally poor, the increase of the first crop from marling will be greater on sandy, than on clay soils; though the latter, by heavier dressings and longer time, may ultimately become the best land, at least for wheat and for grass. The more acid the growth of any soil is, or would be, if suffered to stand, the more increase of crop may be expected from marl; which is directly the reverse of the effects of putrescent manures. The increase of the first crop on worn acid soil, I have never known under fifty per cent., and more often is as much as one hundred—and the improvement continues to increase, under mild tillage, to three or four times the original product of the land. [See Exp. 11, page 46, and Exp. 4 and 6.] In this, and other general statements of effects, I suppose the land to bear not more than two grain crops in four years, and not to be subjected to grazing—and that a sufficient cover of marl has been laid on for use, and not enough to cause disease. It is true, that it is difficult, if not impossible, to fix that proper medium, varying as it may on every change of soil, of situation, and of the kind of marl. But whatever error may be made in the proportion of marl applied, let it be on the side of light dressing, (except where putrescent manures are also laid on, or designed to be laid on before the next course of crops begins)—and if less increase of crop is gained to the acre, the cost and labor of marling will be lessened in a still greater proportion. If, after tillage has served to mix the marl well with the soil, sorrel should still show to any extent, it will sufficiently indicate that not enough marl had been applied, and that it may be added to, safely and profitably. If the nature of the soil, its condition and treatment, and the strength of the marl, all were known, it would

be easy to direct the amount of a suitable dressing: but without knowing these circumstances, it will be safest to give two hundred and fifty, or three hundred bushels to the acre of worn acid soils, and at least twice as much to newly cleared, or well manured land. Besides avoiding danger, it is more profitable to marl lightly at first on weak lands. If a farmer can carry out only ten thousand bushels of marl in a year, he will derive more product, and confer a greater amount of improvement, by spreading it over forty acres of the land intended for his next crop, than on twenty: though the increase to the acre, would probably be greatest in the latter case. By the lighter dressing, the land of the whole farm will be marled, and be storing up vegetable matter for its progressive improvement, in half the time that it could be marled at double the rate.

The greater part of the calcreous earth applied at one time cannot begin to act as manure before several years have passed, owing to the coarse state of many of the shells, and the want of thoroughly mixing them with the soil. Therefore, if enough marl is applied to obtain its full effect on the first course of crops, there will certainly be too much afterwards.

Perhaps the greatest profit to be derived from marling, though not the most apparent, is on such soils as are full of wasting vegetable matter. Here the effect is mostly preservative, and the benefit and profit may be great, even though the increase of crop may be very inconsiderable. Putrescent manure laid on any acid soil, or the natural vegetable cover of those newly cleared, without marl, would soon be lost, and the crops reduced to one-half, or less. But when marl is previously applied, this waste of fertility is prevented; and the estimate of benefit should not only include the actual increase of crop caused by marling, but as much more as the amount of the diminution, which would otherwise have followed. Every intended clearing of woodland, and especially of that under a second growth of pines, ought to be marled before cutting down—and it will be still better, if it can be done several years before. If the application is delayed until the new land is brought under cultivation, though much putrescent matter will be saved, still more must be wasted. By using marl some years before obtaining a crop from it, as many more successive growths of leaves will be converted to useful manure, and fixed in the soil—and the increased fertility will more than compensate for the delay. By such an operation, we make a loan to the soil, with a distant time for payment, but on ample security, and at a high rate of compound interest.

Some experienced cultivators have believed that the most profitable way to manage pine old fields, when cleared of their second growth, was to cultivate them every year, until worn out—because, as they said, such land would not last much longer, no matter how mildly treated. This opinion, which seems so absurd, and in opposition to all the received rules for good husbandry, is considerably supported by the properties which are here ascribed to such soils. When these lands are first cut down, an immense quantity of vegetable matter is accumulated on the surface—which, notwithstanding its accompanying acid quality, is capable of making two or three crops nearly or quite as good as the land was ever able to bring.

But as the soil has no power to retain this vegetable matter, it will begin rapidly to decompose and waste, as soon as exposed to the sun, and will be lost, except so much as is caught while escaping, by the roots of growing crops. The previous application of marl, would make it profitable in these, as well as other cases, to adopt a mild and meliorating course of tillage.

Less improvement will be obtained by marling worn soils of the kind called "free light land," than other acid soils which originally produced much more sparingly. The early productiveness of this kind of soil, and its rapid exhaustion by cultivation, at first view seem to contradict the opinion, that durability and the ease of improving by putrescent manures are proportioned to the natural fertility of the soil. But a full consideration of circumstances will show that no such contradiction exists.

In defining the term *natural fertility*, it was stated that it should not be measured by the earliest products of a new soil, which might be either much reduced, or increased, by temporary causes. The early fertility of free light land is so rapidly destroyed, as to take away all ground for considering it as fixed in, and belonging to the soil. It is like the effect of dung on the same land afterwards, which throws out all its effect in the course of one or two years, and leaves the land as poor as before. But still it needs explanation why so much productiveness can at first be exerted by any acid soil, as in those described in the 14th experiment. The cause may be found in the following reasons. These soils, and also their subsoils, are principally composed of coarse sand, which makes them of more open texture than best suits pine, and (when rich enough) more favorable to other trees, the leaves of which have no natural acid, and therefore decompose more readily. As fast as the fallen leaves rot, they are of course exposed to waste—but the rains convey much of their finer parts down into the open soil, where the less degree of heat retards their final decomposition. Still this enriching matter is liable to be further decomposed, and to final waste: but though continually wasting, it is also continually added to by the rotting leaves above. The shelter of the upper coat of unrotted leaves, and the shade of the trees, cause the first, as well as the last stages of decomposition, to proceed slowly, and to favor the mechanical process of the products being mixed with the soil. But there is no chemical union of the vegetable matter with the soil. When the land is cleared, and opened by the plough, the decomposition of all the accumulated vegetable matter is hastened by the increased action of sun and air, and in a short time converts every thing into food for plants. This abundant supply suffices to produce two or three fine crops. But now, the most fruitful source of vegetable matter has been cut off—and the soil is kept so heated (by its open texture) as to be unable to hold enriching matters, even if they were furnished. The land soon becomes poor, and must remain so, as long as these causes operate, even though cultivated under the mildest rotation. When the transient fertility of such a soil is gone, its acid qualities (which were before concealed in some measure by so much enriching matter,) become evident. Sorrel and broom grass cover the land—and if allowed to stand, pines will

take complete possession, because the poverty of the soil leaves them no rival to contend with.

Marling deepens cultivated sandy soils, even lower than the plough may have penetrated. This was an unexpected result, and when first observed, seemed scarcely credible. But this effect also is a consequence of the power of calcareous earth to fix manures. As stated in the foregoing paragraph, the soluble and finely divided particles of rotted vegetable matters are carried by the rains below the soil: but as there is no calcareous earth there to fix them, they must again rise in a gaseous form, after their last decomposition, unless previously taken up by growing plants. But after the soil is marled, calcareous as well as putrescent matter is carried down by the rains as far as the soil is open enough for them to pass. This will always be as deep as the ploughing has been, and in loose earth, somewhat deeper—and the chemical union formed between these different substances, serves to fix both, and thus increases the depth of the soil. This effect is very different from the deepening of a soil by letting the plough run into the barren subsoil. If by this mechanical process, a soil of only three inches is increased to five, as much as it gains in depth, it loses in richness. But when a marled soil is deepened gradually, its dark color and apparent richness is increased, as well as its depth. Formerly single-horse ploughs were used to break all my acid soils, and even they would often turn up subsoil. The average depth of soil on old land did not exceed three inches, nor two on the newly cleared. Even before marling was commenced, my ploughing had generally sunk into the subsoil—and since 1825, most of this originally thin soil has required three mules, or two good horses to a plough, to break the necessary depth. The soil is now from five to seven inches deep generally, from the joint operation of marling and deepening the ploughing a little in the beginning of every course of crops.

How destructive to the power of soil this depth of ploughing would have been, without marling, may be inferred from the continued decrease of the crop, through four successive courses of a very mild rotation, on the spot kept without marl in experiment 10. Yet the depth of ploughing there did not exceed six inches, and depths of nine and even twelve inches were tried, without injury, on parts of the adjacent marled land.

Besides the general benefit which marling causes equally to all crops, by making the soils they grow on richer and more productive, there are other particular benefits which affect some plants more than others. For example, marling serves to make soils warmer, and thereby hastens the ripening of every crop, more than would take place on the like soils, if made equally productive by other than calcareous manures. This quality of marled land is highly important to cotton, as our summers are not long enough to mature the later pods. Wheat also derives especial benefit from the warmth thus added to the soil: it is enabled better to withstand the severe cold of winter; and even the short time by which its ripening is forwarded by marling, serves very much to lessen the danger of the crop from rust. Wheat also profits by the absorbent power of marled land, (by which sands acquire, to some extent, the best qualities of clays,) though less so than clover and other grasses that flourish best in

a moist climate. Indian corn does not need more time for maturing than our summers afford (except on the poorest land,) and can sustain much drought without injury; and therefore is less aided by these qualities of marled land. Most (if not all) the different plants of the pea kind, and all the varieties of clover, derive such remarkable benefit from marling, that it must be caused by some peculiarity in the nature of those plants. Perhaps a large portion of calcareous earth is necessary as part of their food, to aid in the formation of the substance of plants, as well as to preserve their healthy existence.

On acid soils without manure it is scarcely possible to raise red clover—and even with every aid from putrescent manure, the crop will be both uncertain and unprofitable. The recommendation of this grass as part of a general system of cultivation and improvement, by the author of *Arator*, is sufficient to prove that his improvements were made on soils far better than such as are general. Almost every zealous cultivator and improver (in prospect) of acid soil has been induced to attempt clover culture, either by the recommendations of writers on this grass, or by the success witnessed on better constituted soils elsewhere. The utmost that has been gained by any of these numerous efforts, has been sometimes to obtain one, or at most two mowings, of middling clover, on some very rich lot, which had been prepared in the most perfect manner by the previous cultivation of tobacco. Even in such situations, this degree of success could only be obtained by the concurrence of the most favorable seasons. Severe cold, and sudden alternations of temperature in winter and spring, and the spells of hot and dry weather which we usually have in summer, were alike fatal to the growth of clover, on so unfriendly a soil. The few examples of partial success never served to pay for the more frequent failures and losses; and a few years' trial would convince the most ardent, or the most obstinate advocate for the clover husbandry, that its introduction on the great body of land in Lower Virginia, was absolutely impossible. Still the general failure was by common consent attributed to any thing but the true cause. There was always some reason offered for each particular failure, sufficient to produce it, and but for which, (it was supposed) a crop might have been raised. Either the young plants were killed by freezing soon after first springing from the seed—or a drought occurred when the crop was most exposed to the sun, by reaping the sheltering crop of wheat—or native and hardy weeds overran the crop—and all such disasters were supposed to be increased in force, and rendered generally fatal, by our sandy soil, and hot and dry summers. But after the true evil, *the acid nature of the soil*, is removed by marling, clover ceases to be a feeble exotic. It is at once naturalized on our soil, and is able to contend with rival plants, and to undergo every severity and change of season, as safely as our crops of corn and wheat—and offers to our acceptance the fruition of those hopes of profit and improvement from clover, with which heretofore we have only been deluded.

After much waste of seed and labor, and years of disappointed efforts, I abandoned clover as utterly hopeless. But after marling the fields on which the raising of clover had been vainly attempted, there arose from its scattered and feeble

remains, a growth which served to prove that its cultivation would then be safe and profitable. It has since been gradually extended nearly over all the fields. It will stand well, and maintain a healthy growth on the poorest marled land: but the crop is too scanty for mowing, or perhaps for profit of any kind, on most sandy soils, unless aided by gypsum. Newly cleared lands yield better clover than the old, though the latter may produce as heavy grain crops. The remarkable crops of clover raised on very poor clay soils, after marling, have been already described. This grass, even without gypsum, and still more if aided by that manure, may add greatly to the improving power of marl: but it will do more harm than service, if we greedily take from the soil too large a share of the supply of putrescent matter which it affords.

Some other plants less welcome than clover, are equally favored by marling. Greensward, blue grass, wire grass, and partridge pea, will soon increase so as to be not less impediments to tillage, than evidences of an entire change in the character and power of the soil.

If the foregoing views may be confided in, the general course most proper to pursue in using calcareous manures may thence be deduced without difficulty. But as I have found, since the publication of the first edition of this essay, that many persons still ask for more special directions to guide their operations, and as all such difficulties may not be entirely obviated even by the more full details now given, I will here add the following directions, at the risk of their being considered superfluous. These directions, like all the foregoing reasoning, may apply generally, if not entirely, to the use of all kinds of calcareous manures, and to soils in various regions: but to avoid too wide a range, I shall consider them as applied particularly to the poor lands, and to the fossil shells, or marl, of the tide-water region, and addressed to persons who are just commencing their improvements.

As the cheapest mode of furnishing vegetable matter to land intended to be marled and cultivated, no grazing should be permitted. It is best to put the marl on the grass previous to ploughing the field for corn, as the early effect of this manure is greatest when it has been placed in contact with the vegetable matter. But this advantage is not so great as to induce the ploughing to be delayed, or to stop the marling after that operation. When the marl is spread upon the ploughed surface, it can be better mixed with the soil by the cultivation of the crop—and this advantage in some measure compensates for the loss of that which would have been obtained from an earlier application on the sod. If marl is ploughed in, it should not be so deeply as to prevent its being mixed with the soil, speedily and thoroughly, by the subsequent tillage. To make sure of equal distribution, the marl should be spread regularly over the surface. From neglect in this respect, a dressing of marl is often too thin in many places to have its proper effect, and in others, so thick as to prove injurious. Hence it is, that marl-burnt stalks of corn, and tufts of sorrel are sometimes seen on the same acre.

After the first year, the farmer may generally marl fast enough to keep ahead of his cultivation: and even though he should reduce the space of his tillage to one-half, it will be best for him not to put an acre in corn without its being marled. Fif-

ty acres can generally be both marled and tilled, as cheaply as one hundred can be tilled without marling; and the fifty will produce as much as the hundred, in the first course of crops, and much more afterwards.

That rotation of crops which gives most vegetable matter to the soil, is best to aid the effect of marl recently applied. The four-shift rotation is convenient in this respect, because two or three years of rest may be given in each course of the rotation at first, upon the poorest land; and the number of exhausting crops may be increased, first to two, then to three in the rotation, as the soil advances to its highest state of productiveness.

After marling, clover should be sown, and gypsum on the clover. On poor, though marled land, of course only a poor growth of clover can be expected: but wherever other manures are given, and especially if gypsum is found to act well, the crop of clover becomes a most important part of the improvement by marling. Without clover, and without returning the greater part of its product to the soil, the great value of marling will not be seen. A small proportion of the clover may be used as food for cattle—and in a few years this small share will far exceed all the grass that the fields furnished before marling, and the limitation of grazing. What is at first considered as lessening the food of grazing stock, and their products, within a few years becomes the source of a far more abundant supply.

During the first few years of marling, but little attention can (or ought to) be given to making putrescent manures, because the soil much more needs calcareous manure—and three acres may generally be supplied with the latter, as cheaply as one with the former. But putrescent manures cannot any where be used to so much advantage, as upon poor soils made calcareous: and no farmer can make and apply vegetable matter as manure to greater profit than he who has marled his poor fields, and can then withdraw his labor from applying the more to the less profitable manure. After the farm has been marled over at the light rate recommended at first, every effort should be made to accumulate and apply vegetable manures—and with their gradual extension over the fields, a second application of marl may be made, making the whole quantity in both the first and second marling 500 or 600 bushels to the acre, or even more, which would have been hurtful if given at first, but which will now be not only harmless, but necessary to fix and retain so much putrescent and nutritive matter in the soil.

If the course here advised is pursued on poor and acid soils, the products will be generally doubled in the first course of the rotation—often in the first crop immediately following the marling: and the original product may be expected to be tripled by the third return of the rotation. This will be from merely applying marl in sufficient (and not excessive) quantities, and giving the land two years rest in four, without grazing. But with the aid of farm-yard and other putrescent manures, and of clover, both of which should be largely in use during the second course of crops, still greater returns may be obtained.

When such statements as these are made, the question naturally occurs to the reader, "Has the writer himself met with so much success, and what has been the actual result of his labors in general,

in the business so strongly recommended?" This question I have no right to shrink from, although the answer to be given fully, will be objectionable, from the egotism inseparable from such details, which are certainly not worth being thus presented to public notice, and which are called for only because silence on this head might be considered as operating against the general tenor of this essay. It will be sufficient here to state generally, that my average profits from marling, and the increased fertility derived from it, have not been as great as are promised above, nor such as might be expected from the most successful experiments of which the results have been reported—and for these reasons. 1st. The greater part of my land was not of soil the best adapted to be improved by marling. 2nd. Having every thing to learn, and to prove by trial, much of my labor was lost uselessly, or spent in excessive and injurious applications. 3d. The fitness given to the soil by marl to produce clover was not known until long after that auxiliary to improvement ought to have been in full use. 4th. From the want of labor and capital to use both calcareous and putrescent manures, the collecting and applying of the latter were almost entirely neglected as long as there was full employment in marling. And 5th. That general bad practical management, which I have to admit has marked all my business, has of course also affected injuriously this important branch—though in a less degree, because it was as much as possible under my personal and close attention. With all these drawbacks to complete success, I am able to state the following general results of my operations. Omitting the land on Coggin's Point farm not susceptible of any considerable or profitable improvement from marling, the great body of the farm, has been tripled in productive power since 1818, when my first experiment was made. Particular bodies of soil now produce fourfold the former amount without any other kind of manure: and the whole farm including the parts least improved as well as the most, and allowing for the increase of extent, will now make more than double of its best product before marling.

With all the increase of products that I have ascribed to marling, the heaviest crops stated may appear inconceivable to farmers who till soils more favored by nature. Corn yielding twenty-five or thirty bushels to the acre, is doubled by many natural soils in the western states; and ten or twelve bushels of wheat, will still less compare with the product of the best limestone clay land. The cultivators of our poor region, however, know that such products, without any future increase, would be a prodigious addition to their present gains. Still it is doubtful whether these rewards are sufficiently high to tempt many of my countrymen speedily to accept them. The opinions of many farmers have been so long fixed, and their habits are so uniform and unvarying, that it is difficult to excite them to adopt any new plan of improvement, except by promises of profits so great, that an uncommon share of credulity would be necessary to expect their fulfilment. The net profits of marling, if estimated at twenty or even fifty per cent. per annum, on the expense, forever—or the assurance by good evidence, of doubling the crops of a farm in ten years or less—will scarcely attract the attention of those who would embrace without any scrutiny, a plan that promised five

times as much. Hall's scheme for cultivating corn was a stimulus exactly suited to their lethargic state: and that impudent Irish impostor found many steady old-fashioned farmers willing to pay for his directions for making five hundred barrels of corn, with only the hand labor of two men.

The products and profits derived from the use of marl as presented in the preceding pages, considerable as they are, have been kept down, or lessened in amount, by my then want of experience, and ignorance of the danger of injudicious applications. My errors may at least enable others to avoid similar losses, and thereby to reach equal profits with half the expense of time and labor. But are we to consider even the greatest increase of product that has been yet gained in a few years after marling, as showing the full amount of improvement and profit to be derived? I think not: and if we may venture to leave the sure ground of practical experience, and look forward to what is promised by the theory of the operation of calcareous manures, we must anticipate future crops far exceeding what have yet been obtained. To this, the ready objection may be opposed, that the sandiness of the greater part of our lands will always prevent their being raised to a high state of productiveness—and particularly, that no care, nor improvement can make heavy crops of wheat on such soils. This very general opinion is far from being correct—and as the error is important, it may be useful to offer some evidence in support of the great value to which sandy soils may arrive.

We are so accustomed to find sandy soils poor, that it is difficult for us to connect with them the idea of fertility, and still less of durability. Yet British agriculturists, who were acquainted with clays and clay loams, of as great value, and as well managed under tillage, as any in the world, speak in still higher terms of certain soils, which are even more sandy than most of ours. For example—"Rich sandy soils, however," says Sir John Sinclair, "such as those of Frodsham in Cheshire, are invaluable. They are cultivated at a moderate expense; and at all times have a dry soundness, accompanied by moisture, which secures excellent crops, even in the driest summers."* Robert Brown, (one of the very few who has deserved the character of being both an able writer, and a successful practical cultivator,) says—"Perhaps a true sandy loam incumbent on a sound subsoil, is the most valuable of all soils."† Young, when describing the soils of France, in his agricultural survey of that country, in several places speaks in the highest terms of different bodies of light or sandy soils, of which the following example, of the extensive district which he calls the plain of the Garonne, will be enough to quote: "It is entered about Creisensac, and improves all the way to Montauban and Toulouse, where it is one of the finest bodies of fertile soil that can any where be seen."—"Through all this plain, wherever the soil is found excellent, it consists usually of a deep mellow friable sandy loam, with moisture sufficient for any thing; much of it is calcareous."‡ The soil of Belgium so cele-

* Code of Agriculture, p. 12.

† Brown's Treatise on Agriculture, p. 218, of "Agriculture" in Edin. Ency.

‡ Young's Tour in France.

brated for its high improvement and remarkable productiveness, is mostly sandy. The author last quoted, in another work describes a body of land in the county of Norfolk, as "one of the finest tracts that is any where to be seen"—"a fine, deep, mellow, putrid sandy loam, adhesive enough to fear no drought, and friable enough to strain off superfluous moisture, so that all seasons suit it: from texture free to work, and from chemical qualities sure to produce in luxuriance whatever the industry of man commits to its friendly bosom."* Mr. Coke, the great Norfolk farmer, made on the average 24 bushels of wheat to the acre, on an estate of as sandy soil as our Southampton, (where probably a general average of two bushels could not be obtained, if general wheat culture was attempted)—and many other farms in Norfolk yielded much better wheat than Mr. Coke's in 1804, when Young's survey was made. Several farms averaged 36 bushels, and one of 40 is stated: and the general average of the county was 24 bushels.† Yet the county of Norfolk was formerly pronounced by Charles II. to be only fit "to cut up into strips, to make roads of for the balance of the kingdom"—and that sportive description expressed strongly the sandy nature of the soil, as well as its then state of poverty.

Because certain qualities of poor clay soils (particularly their absorbent power) make them better than poor sands for producing wheat, we most strangely attach a value to the stiffness and intractability of the former. Yet if all the absorbent quality and productive power of clay could be given to sand, surely the latter would be the more valuable in proportion to its being friable and easy to cultivate. The causes of all the valuable qualities and productive power of the rich sands that have been referred to, are only calcareous and putrescent manures, and depth of soil: and if the same means can be used, our sands may also be made as productive and valuable. I do not mean to assert that the most highly improved sandy soil can produce as much wheat as the best clay soils; but they will not fall so far short as to prevent their being the most valuable land, for wheat as well as other crops, on account of their being so easily cultivated, and less liable to suffer from bad seasons, or bad management. [Appendix K.]

CHAPTER XVII.

THE PERMANENCY OF CALCAREOUS MANURES.

PROPOSITION 5. *Continued.*

It was stated, (page 36) that the ground on which an old experiment was made and abandoned as a failure, more than fifty years ago, still continues to show the effects of marl. Lord Kames mentions a fact of the continued beneficial effect of an application of calcareous manure, which was known to be one hundred and twenty years old.‡ Every author who has treated of manures of this nature,

attests their long duration: but when they say that they will last twenty years, or even one hundred and twenty years, it amounts to the admission that at some future time the effects of these manures will be lost. This I deny—and from the nature and action of calcareous earth, claim for its effects a duration that will have no end.

If calcareous earth applied as manure is not afterwards combined with some acid in the soil, it must retain its first form, which is as indestructible, and as little liable to be wasted by any cause whatever, as the sand and clay that form the other earthy ingredients of the soil. The only possible vent for its loss, is the very small proportion taken up by the roots of plants, which is so inconsiderable as scarcely to deserve naming.

Clay is a manure for sandy soils, serving to close their too open texture. When so applied, no one can doubt but that this effect of the clay will last as long as its presence. Neither can calcareous earth cease to exert its peculiar powers as a manure, any more than clay can, by the lapse of time, lose its power of making sands more firm and adhesive. Making due allowance for the minute quantity drawn up into growing plants, it is as absurd to assert that the calcareous earth in a soil, whether furnished by nature or not, can be exhausted, as that cultivation can deprive a soil of its sand or clay.

But on my supposition that calcareous earth will change its form by combining with acid in the soil, it may perhaps be doubted whether it is equally safe from waste under its new form. It must be admitted, that the permanency of this compound cannot be proved by its insolubility, or other properties, because neither the kind nor the nature of the salt itself is yet known.* But judging from the force with which good neutral soils resist the exhaustion of their fertility, and their always preserving their peculiar character, it cannot be believed that the calcareous earth once present, was lessened in durability by its chemical change of form. It has been contended that the action of calcareous earth is absolutely necessary to make a poor acid soil fertile: but it does not thence follow that other substances, and particularly this salt of lime, may not serve as well to preserve the fertility bestowed by calcareous earth. All that is required for this purpose, is the power of combining with putrescent matter, and thereby fixing it in the soil: and judging solely from effects, this power seems to be possessed in an eminent degree by this new combination of lime. If this salt is the oxalate of lime, (as there is most reason to believe,) it is insoluble in water, and consequently safe from waste—and the same property belongs to most other combinations of lime with vegetable acid. The acetate of lime is soluble in water, and while alone, might be carried off by rains. But if it combines with putrescent matter, by chemical affinity, its previous solubility will no longer remain. Copperas is easily soluble: but when it forms one of the component parts of ink, it can no longer be separately dis-

*This passage is left as it stood in the first edition, before the discovery of the humic acid was known. Indeed no aid has been derived from that discovery, nor any change of language made in consequence of it, except by inserting the quotation respecting this substance, and the remarks thereon, at page 28.

*Young's Survey of Norfolk, p. 4.

†Young's Survey of Norfolk, p. 300 to 304.

‡Gentleman Farmer, page 266, 2d Edin. Ed.

solved by water, or taken away from the coloring matter combined with it. In rich limestone soils, and some of our best river lands, in which no calcareous earth remains, we may suppose that its change of form took place centuries ago. Yet however scourged and exhausted by cultivation, they still show as strongly as ever, those qualities which were derived from their former calcareous ingredient. When the dark color of such soils, their power of absorption, and of holding manures, their friability, and their peculiar fitness for clover and certain other plants, are no longer to be distinguished, then, and not before, may the salt of lime be considered as lost to the soil.

If we keep in mind the mode by which calcareous manure acts, its effects may be anticipated for a much longer time than my experience extends. Let us trace the supposed effects, from the causes, on an acid soil kept under meliorating culture. As soon as applied, the calcareous earth combines with all the acid then present, and to that extent, is changed to the vegetable salt of lime. The remaining calcareous earth continues to take up the after formations of acid, and (together with the salt so produced,) to fix putrescent manures, as fast as these substances are presented, until all the lime has been combined with acid, and all their product combined with putrescent matter. Both those actions then cease. During all the time necessary for those changes, the soil has been regularly increasing in productiveness; and it may be supposed that before their completion, the product had risen from ten to thirty bushels of corn to the acre. The soil has then become neutral. It can never lose its ability (under the mild rotation supposed,) of producing thirty bushels—but it has no power to rise above that product. Vegetable food continues to form, but is mostly wasted, because the salt of lime is already combined with as much as it can act on; and whatever excess of vegetable matter remains on the soil, is kept useless by acid also newly formed, and left free and noxious, as before the application of calcareous earth. But though this excess of acid may balance and keep useless the excess of vegetable matter, it cannot affect the previously fixed fertility, nor lessen the power of the soil to yield its then maximum product of thirty bushels. In this state of things, sorrel may again begin to grow, and its return may be taken as notice that a new marling is needed, and will afford additional profit, in the same manner as before, by destroying the last formed acid, and fixing the last supply of vegetable matter. Thus perhaps five or ten bushels more may be added to the previous product, and a power given to the soil gradually to increase as much more, before it will stop again for similar reasons, at a second maximum product of forty or fifty bushels. I pretend not to fix the time necessary for the completion of one or more of these gradual changes: but as the termination of each, and the consequent additional marling, will add new profits, it ought to be desired by the farmer, instead of his wishing that his first labor of marling each acre, may also be the last required. Every permanent addition of five bushels of corn to the previous average crop, will more than repay the heaviest expenses that have yet been encountered in marling. But whether a second application of marl is made or not, I cannot imagine such a consequence as the actual decrease of the product

once obtained. My earliest marled land has been severely cropped, compared to the rotation supposed above, and yet has continued to improve, though at a slow rate. The part first marled in 1818, has since had only four years of rest in fifteen; and has yielded nine crops of grain, one of cotton, and one year clover twice mowed. This piece, however, besides being sown with gypsum, (with little benefit,) once received a light cover of rotted corn-stalk manure. The balance of the same piece of land (Exp. 1.) was marled for the crop of 1821—has borne the same treatment since, and has had no other manure, except gypsum once, (in 1830,) which acted well. These periods of twelve and fifteen years, are very short to serve as grounds to decide on the eternal duration of a manure. But it can scarcely be believed that the effect of any temporary manure, would not have been somewhat abated by such a course of severe tillage. Under milder treatment, there can be no doubt but there would have been much greater improvement.

If subjected to a long course of the most severe cultivation, a soil could not be deprived of its calcareous ingredient, whether natural or artificial: but though still calcareous, it would be in the end, reduced to barrenness, by the exhaustion of its vegetable matter. Under the usual system of exhausting cultivation, marl certainly improves the product of acid soils, and may continue to add to the previous amount of crop, for a considerable time: yet the theory of its action instructs us, that the ultimate result of marling under such circumstances, must be the more complete destruction of the land, by enabling it to yield all its vegetable food to growing plants, which would have been prevented by the continuance of its former acid state. An acid soil yielding only five bushels of corn may contain enough food for plants to bring fifteen bushels—and its production will be raised to that mark, as soon as marling sets free its dormant powers. But a calcareous soil reduced to a product of five bushels, can furnish food for no more, and nothing but an expensive application of putrescent manures, can render it worth the labor of cultivation. Thus it is, that soils, the improvement of which is most hopeless without calcareous manures, will be the most certainly improved with profit by their use.

CHAPTER XVIII.

THE EXPENSE AND PROFIT OF MARLING.

PROPOSITION 5. *Concluded.*

At this time there are but few persons among us who doubt the great benefit to be derived from the use of marl: and many of those who ten years ago deemed the practice the result of folly, and a fit subject for ridicule, now give that manure credit for virtues which it certainly does not possess; and from their manner of applying it, seem to believe it a universal cure for sterility. Such erroneous views have been a principal cause of the many injudicious and even injurious applications of marl. It is as necessary to moderate the ill-founded expectations which many entertain, as to excite the too feeble hopes of others.

The improvement caused by marling, and its per-

manency, have been established beyond question. Still the improvement may be paid for too dearly—and the propriety of the practice must depend entirely on the amount of its clear profits, ascertained by fair estimates of the expenses incurred.

With those who attempt any calculations of this kind, it is very common to set out on the mistaken ground that the expense of marling should bear some proportion to the selling price of the land: and without in the least underrating the effects of marl, they conclude that the improvement cannot justify an expense of six dollars on an acre of land that would not previously sell for four dollars. Such a conclusion would be correct if the land was held as an article for sale, and intended to be disposed of as soon as possible: as the expense in that case might not be returned in immediate profit, and certainly would not be added to the price of the land by the purchaser, under present circumstances. But if the land is held as a possession of any permanency, its previous price, or its subsequent valuation, has no bearing whatever on the amount which it may be profitable to expend for its improvement. Land that sells at four dollars, is often too dear at as many cents, because its product will not pay the expense of cultivation. But if by laying out for the improvement ten dollars, or even one hundred dollars to the acre, the average increased annual profit would certainly and permanently be worth ten per cent. on that cost of improvement, then the expenditure would be highly expedient and profitable. We are so generally influenced by a rage for extending our domain, that another farm is often bought, stocked and cultivated, when a liberal estimate of its expected products, would not show an annual clear profit of three per cent.: and any one would mortgage his estate to buy another thousand acres, that was supposed fully capable of yielding ten per cent. on its price. Yet the advantage would be precisely the same, if the principal money was used to enrich the land already in possession, (without regard to its extent, or previous value,) with equal assurance of its yielding the same amount of profit.

Nothing is more general, or has had a worse influence on the state of agriculture, than the desire to extend our cultivation, and landed possessions. One of the consequences of this disposition, has been to give an artificial value to the poorest land, considered merely as so much territory, while various causes have concurred to depress the price of all good soils much below their real worth. Whatever a farm will sell for, fixes its value as merchandise; but by no means is it a fair measure of its value as permanent farming capital.

The true value of land, and also of any permanent improvements to land, I would estimate in the following manner. Ascertain as nearly as possible the average clear and permanent income, and the land is worth as much money as would securely yield that amount of income, in the form of interest—which may be considered as worth 6 per cent. For example, if a field brings ten dollars average value of crops to the acre, in every course of a four-shift rotation, and the average expense of every kind necessary to carry on the cultivation, is also ten dollars—then the land yields nothing, and is worth nothing. If the average clear profit was two dollars and forty cents in the

term, or only sixty cents a year, it would raise the value of the land to ten dollars—and if six dollars could be made annually, clear of all expense, it is equally certain that one hundred dollars would be the fair value of the acre. Yet if lands of precisely these rates of profit were offered for sale at this time, the poorest would probably sell for two dollars, and the richest for less than thirty dollars. In like manner, if any field that paid the expense of cultivation before, has its average annual net product increased six dollars for each acre, by some permanent improvement, the value thereby added to the field is one hundred dollars the acre, without regard to its former worth. Let the cost and value of marling be compared by this rule, and it will be found that the capital laid out in that mode of improvement will seldom return an annual interest of less than twenty per cent.—that it will more often equal forty—and sometimes reach even one hundred per cent. of annual and permanent interest on the investment. The application of this rule for the valuation of such improvements, will raise them to such an amount, that the magnitude of the sum may be deemed a sufficient contradiction of my estimates. But before this mode of estimating values is rejected, merely on the supposed absurdity of an acid soil being considered as raised from one dollar to thirty dollars per acre, by a single marling, let it at least be examined, and its fallacy exposed.

I admit the practical difficulty of applying this rule, however certain may be its theoretical truth. It is not possible to fix on the precise clear profit of any farm to its owner and cultivator; and any error made in these premises, is increased sixteen fold in the estimate of value founded on them. Still we may approximate the truth with most certainty by using this guide. The early increase of crop from marling, will in most cases be an equal increase of clear profit, (for the subsequent improvement and the additional offal will surely pay for the increase of labor—) and it is not very difficult to fix a value for that actual increase of crop, and thereby to estimate the capital value of the improvement.

This mode of valuing land, under a different form, is universally received as correct in England. Cultivation there is carried on almost entirely by tenants: and the annual rent which any farm brings on a long lease, fixes beyond question what is its annual clear profit to the owner. The price, or value of land, is generally estimated at so many "years' purchase," which means as many years' rent as will return the purchaser's money. There, the interest of money being low, increases the value of land according to this mode of estimation; and it is generally sold as high as twenty years' purchase. My estimate is less favorable for raising the value of our lands, as it fixes them at sixteen and a half years' purchase, according to our higher rate of interest on money. But though this rule for estimating the true value of land, and of the improvements made by marling, may be unquestionable in theory, still a practical objection will be presented by the well known fact that the income and profits of farmers are not increased in proportion to such improvements, nor is there found such a vast disproportion as this rule of estimating values would show, between the profits of the tillers of poor and of rich land. These positions are admitted to be generally well founded—

but it is denied that they invalidate the previous estimates. A farmer may, and generally does, obtain less gross product from a large or a rich farm, than his more necessitous, and therefore more attentive and economical neighbor gets from a smaller or poorer farm, in proportion to the producing power of each; and even the same persons, when young and needy, have often made more profit according to their means, than afterwards when relieved from want, and having land increased to a quadruple power of production. These, and similar facts, however general, only are examples of the obvious truth that the profits of land depend principally on the industry, economy, and good management of the cultivator—and that many a farmer who can manage well a small or poor farm, is more deficient in industry, economy, or the increased degree of knowledge required, when possessed of much more abundant resources. In short, if these considerations were to direct or influence our estimates, we should not be comparing and estimating the value of lands, but the value of the care and industry bestowed on their management.

Another objector may ask, "If any poor land is raised in value (according to this estimate) from one dollar to thirty by marling, would a purchaser make a judicious investment of his capital, by buying this improved land at thirty dollars?" I would answer in the affirmative, if our view was confined to this particular means of investing farming capital. The purchaser would get a clear interest of six per cent.—which is always a good return from land, and is twice as much as all Lower Virginia now yields. But if such a purchase is compared with other means of acquiring land so improved, it would be extremely injudicious—because thirty dollars expended in purchasing and marling such land, would serve both to acquire and improve five or six acres.

Estimates of the expenses required for marling are commonly erected on as improper grounds, as those of its profits. We never calculate the cost of any old practice. We are content to clear woodland that afterwards will not pay for the expense of tillage—to keep under the plough, land reduced to five bushels of corn to the acre—to build and continue to repair miles of useless and perishable fences—to make farm-yard manure (though not much of this fault,) and apply it to acid soils—without once calculating whether we lose or gain by any of these operations. But let any new practice be proposed, and then every one begins to count its cost—and on such erroneous premises, that if applied to every kind of farm labor, the estimate would prove that the most fertile land known, could scarcely defray the expenses of its cultivation.

According to estimates made with much care and accuracy, the cost of an uncommonly expensive job of marling, four thousand and thirty-six bushels in quantity, in 1824, amounted to five dollars and thirty-five cents the acre, for five hundred and ninety-eight bushels of marl. This quantity was much too great: four hundred bushels would have been quite enough for safety and profit, and would have reduced the whole expense, including every necessary preparation, to three dollars and fifty-eight cents the acre. The earth which was taken off, to uncover the bed of marl, was considerably thicker than the marl itself. The road from

the pit ascended hills amounting to forty feet of perpendicular elevation—and the average distance to the field was eight hundred and forty-seven yards.

In 1828, I began to marl another tract of land, where the difficulties were less. The labor bestowed served to carry out and spread six thousand eight hundred and ninety-two tumbril loads, on one hundred and twenty acres of land, being an average of two hundred and fifty-nine bushels to the acre. The exhausted state of the soil made heavier dressing unsafe. The whole expense of the operation, including all the preparatory labor, amounted to two dollars and eight cents for each acre marled—or eighty-three hundredths of a cent for each heaped bushel of marl. [Appendix L.]

It is impossible to carry on marling to advantage, or with any thing like economy, unless it is made a regular business, to be continued throughout the year or a specified portion of it, by a laboring force devoted to that purpose, and not allowed to be withdrawn for any other. Instead of proceeding on this plan, most persons who have begun to marl, attempt it in the short intervals of leisure, afforded between their different farming operations—and without lessening for this purpose, the extent of their usual cultivation. Let us suppose that preparations have been made, and on the first opportunity, a farmer commences marling with zeal and spirit. But every new labor is attended by causes of difficulty and delay, and a full share of these will be found in the first few days of marling. The road is soft for want of previous use, and if the least wet, soon becomes miry. The horses, unaccustomed to carting, balk at the hills, or only carry half loads. Other difficulties occur from the awkwardness of the laborers, and the inexperience of their master—and still more from the usual unwillingness of his overseer to devote any labor to improvements which are not expected to add to the crop of that year. Before matters can get straight, the leisure time is at an end: the work is stopped, and the road and pit are left to get out of order, before making another attempt some six months after, when all the same vexatious difficulties are again to be encountered.

If only a single horse was employed in drawing marl throughout the year, at the moderate allowance of two hundred working days, and one hundred bushels carried out for each, his year's work would amount to twenty thousand bushels, or enough for more than sixty acres. This alone would be a great object effected. But besides, this plan would allow the profitable employment of any amount of additional labor. When at any time, other teams and laborers could be spared to assist, though for only a few days, every thing is ready for them to go immediately to work. The pit is drained, the road is firm, and the field marked off for the loads. In this way, much labor may be obtained in the course of the year, from teams that would otherwise be idle, and laborers whose other employments would be of but little importance. The spreading of marl on the field, is a job that will always be ready to employ any spare labor: and throwing off the covering earth from an intended digging of marl, may be done, when rain, snow, or severe cold, have rendered the earth unfit for almost every other kind of labor.

Another interesting question respecting the expense of this improvement is, to what distance from the pit may marl be profitably carried? If the amount of labor necessary to carry it half a mile is known, it is easy to calculate how much more will be required for two or three miles. The cost of teams and drivers is in proportion to the distance travelled—but the pit and field labor, is not affected by that circumstance. At present, when so much poor land, abundantly supplied with fossil shells, may be bought at from two dollars to four dollars the acre, a farmer had better buy and marl a new farm, than to move marl even two miles to his land in possession. But this would be merely declining one considerable profit, for the purpose of taking another much greater. Whenever the value of marl is properly understood, and our lands are priced according to their improvements, or their capability of being improved from that source, as must be the case hereafter, then this choice of advantages will no longer be offered. Then rich marl will be profitably carted miles from the pits, and perhaps conveyed by water as far as it may be needed. A bushel of such marl as the bed on James River, described page 49, is as rich in calcareous earth alone, as a bushel of slaked lime will be after it becomes carbonated—and the greater weight of the first, is a less disadvantage for water carriage, than the price of the latter. Farmers on James River who have used lime as manure to great extent and advantage, might more cheaply have moved rich marl twenty miles by water, as it would cost nothing but the labor of digging and transportation.

Within the short time that has elapsed since the first publication of the foregoing passages in the first edition of this essay, the transportation of marl by water carriage has been commenced on James River, and has been carried on with more facility and at less expense, than was anticipated. The farmers who may profit by this new mode of using marl, will be indebted to the enterprise of C. H. Minge, Esq. of Charles City, for the making a full and satisfactory experiment of the business on a large scale. [See Appendix M.]

The objections to carrying marl unusual distances, admitted above, apply merely to improvements proposed for field culture. But it would be profitable, even under existing circumstances, for rich marl to be carried five miles by land, or one hundred miles by water, for the purpose of being applied to gardens, or other land kept under perpetual tillage, and receiving frequent and heavy coverings of putrescent manure. In such cases, independent of the direct benefit which the calcareous earth might afford to the crops, its power of combining with putrescent matters, and preventing their waste, would be of the utmost importance. If the soil was acid, the making it calcareous would enable half the usual supplies of manure, to be more effective and durable than the whole had been. There are other uses for marl, about dwelling houses and in towns, which should induce its being carried much farther than mere agricultural purposes would warrant. I allude to the use of calcareous earth in preserving putrescent matters, and thereby promoting cleanliness, and health. This important subject will hereafter be separately considered.

Either lime or good marl may hereafter be profitably distributed over a remote strip of poor land,

by means of the rail road now constructing from Petersburg to the Roanoke: providing the proprietors do not imitate the over greedy policy of the legislature of Virginia, in imposing tolls on manures passing through the James River canal. If there was no object whatever in view, but to draw the greatest possible income from tolls on canals and roads, true policy would direct that all manures should pass from town to country toll free. Every bushel of lime, marl, or gypsum, thus conveyed, would be the means of bringing back in future time, more than as much wheat or corn—and there would be an actual gain in tolls, besides the twenty fold greater increase to the wealth of individuals and the state. Wood ashes, after being deprived of their potash, have calcareous earth, and a smaller proportion of phosphate of lime, as their only fertilizing ingredients; and both together do not commonly make more than there is of calcareous earth in the same bulk of good marl. Yet drawn ashes have been purchased largely from our soap factories, at four cents the bushel, and carried by sea to be sold for manure to the farmers of Long Island. Except for the proportion of phosphate of lime which they contain, drawn ashes are simply artificial marl—more fit for immediate action, by being finely divided, but weaker in amount of calcareous earth than our best beds of fossil shells.

The argument in support of the several propositions which have been discussed through so many chapters, is now concluded. However unskillfully, I flatter myself that it has been effectually used; and that the general deficiency in our soils of calcareous earth—the necessity of supplying it—the profit by that means to be derived—and the high importance of all these considerations—have been established too firmly to be shaken by either arguments or facts.

CHAPTER XIX.

THE USE OF CALCAREOUS EARTH RECOMMENDED TO PRESERVE PUTRESCENT MANURES, AND TO PROMOTE CLEANLINESS AND HEALTH, ESPECIALLY IN TOWNS.

The operation of calcareous earth in enriching barren soils, has been traced, in a former part of this essay, to the chemical power possessed by that earth of combining with putrescent matters, or with the products of their fermentation—and in that manner, preserving them from waste, for the use of the soil, and for the food of growing plants. That power was exemplified by the details of an experiment, (page 31,) in which the carcass of an animal was so acted on, and its enriching properties secured. That trial of the putrefaction of animal matter in contact with calcareous earth, was commenced with a view to results very different from those which were obtained. Darwin says that *nitrous acid* is produced in the process of fermentation, and he supposes the *nitrate of lime* to be very serviceable to vegetation.* As the nitrous acid is a gas, it must pass off into the air,

*Darwin's Phytologia, pp. 210 and 224. Dublin Edition.

under ordinary circumstances, as fast as it is formed, and be entirely lost. But as it is strongly attracted by lime, it was supposed that a cover of calcareous earth would arrest it, and form a new combination, which, if not precisely nitrate of lime, would at least be composed of the same elements, though in different proportions. To ascertain whether any such combination had taken place, when the manure was used, a handful of the marl was taken, which had been in immediate contact with the carcass, and thrown into a glass of hot water. After remaining half an hour, the fluid was poured off, filtered, and evaporated, and left a considerable proportion of a white soluble salt (supposed eight or ten grains.) I could not ascertain its kind—but it was not deliquescent, and therefore could not have been the nitrate of lime. The spot on which the carcass lay, was so strongly impregnated by this salt, that it remained bare of vegetation for several years, and until the field was ploughed up for cultivation.

But whatever were the products of fermentation saved by this experiment, the absence of all offensive effluvia throughout the process sufficiently proved that little or nothing was lost—as every atom must be, when flesh putrefies in the open air: and I presume that a cover of equal thickness of clay, or sand, or any mixture of both, without calcareous earth, would have had very little effect in arresting and retaining the aeriform products of putrefaction. All the circumstances of this experiment, and particularly the good effect exhibited by the manure when put to use, prove the propriety of extending a similar practice. In the neighborhood of towns, or wherever else the carcasses of animals, or any other animal substances subject to rapid and wasteful fermentation, can be obtained in great quantity, all their enriching powers might be secured, by depositing them between layers of marl, or calcareous earth in any other form. On the borders of the Chowan, immense quantities of herrings are often used as manure, when purchasers cannot take off the myriads supplied by the seines. A herring is buried under each corn-hill, and fine crops are thus made as far as this singular mode of manuring is extended. But whatever benefits may have been thus derived, the sense of smelling, as well as the known chemical products of the process of animal putrefaction, make it certain that nine-tenths of all this rich manure, when so applied, must be wasted in the air. If those who fortunately possess this supply of animal manure, would cause the fermentation to take place and be completed, mixed with and enclosed by marl, in pits of suitable size, they would increase prodigiously both the amount and permanency of their acting animal manure, besides obtaining the benefit of the calcareous earth mixed with it.

But without regarding such uncommon, or abundant sources for supplying animal matter, every farmer may considerably increase his stock of putrescent manure, by using the preservative power of marl, and all the substances that might be so saved, are not only now lost to the land, but serve to contaminate the air while putrefying, and perhaps to engender diseases. The last consideration is of most importance to towns, though worthy of attention every where. Whoever will make the trial will be surprised to find how much putrescent matter may be collected from the dwell-

ling house, kitchen, and laundry of a family: and which if accumulated (without mixture with calcareous earth,) will soon become so offensive as to prove the necessity of putting an end to the practice. Yet it must be admitted that when all such matters are scattered about (as is usual both in town and country,) over an extended surface, the same putrefaction must ensue, and the same noxious effluvia be evolved, though not enough concentrated to be very offensive, or even always perceptible. The same amount is inhaled—but in a very diluted state, and in small, though incessantly repeated doses. But if mild calcareous earth in any form (and fossil shells or marl present much the cheapest,) is used to cover and mix with the putrescent matters so collected, they will be prevented from discharging offensive effluvia, and preserved to enrich the soil. A malignant and ever acting enemy will be converted to a friend and benefactor.

The usual dispersion and waste of such putrescent and excrementitious matters about a farm house, though a considerable loss to agriculture, may take place without being very offensive to the senses, or certainly injurious to health. But the case is widely different in towns. There, unless great care is continually used to remove or destroy filth of every kind, it soon becomes offensive, if not pestilential. During the last summer, (1832) when that most horrible scourge of the human race, the Asiatic cholera, was desolating some of the towns of the United States, and all expected to be visited by its fatal ravages, great and unusual exertions were every where used to remove and prevent the accumulation of filth, which if allowed to remain, it was supposed would invite the approach, and aid the effects of the pestilence. The efforts made for that purpose served to show what a vast amount of putrescent matter existed in every town, and which was so rapidly reproduced, that its complete riddance was impossible. Immense quantities of the richest manures, or materials for them, were washed away into the rivers—caustic lime was used to destroy them—and the chloride of lime to decompose the offensive products of their fermentation, when that process had already occurred. All this amount of labor and expense was directed to the complete destruction of what might have given fertility to many adjacent fields—and yet served to cleanse the towns but imperfectly, and for a very short time. Yet the object in view might have been better attained by the previous adoption of the proper means for preserving these putrescent matters, than by destroying them.—These means would be to mix or cover all accumulations of such matters with rich marl, (which would be the better for the purpose if its shells were in small particles,) and in such quantity as the effect would show to be sufficient. But much the greater part of the filth of a town is not, and cannot be accumulated; and from being dispersed, is the most difficult to remove, and is probably the most noxious in its usual course of fermentation. This would be guarded against by covering thickly with marl the floor of every cellar and stable, back yard and stable lot. Every other vacant space should be lightly covered. The same course pursued on the gardens and other cultivated grounds, would be sufficiently compensated by the increased product that would be obtained: but independent of that consideration, the manure

there applied would be prevented from escaping into the air—and being wholly retained by the soil, much smaller applications would serve. The level streets ought also to be sprinkled with marl, and as often as circumstances might require. The various putrescent matters usually left in the streets of a town alone serve to make the mud scraped from them a valuable manure; for the principal part of the bulk of street mud is composed merely of the barren clay, brought in upon the wheels of wagons from the country. Such a cover of calcareous earth would be the most effectual absorbent and preserver of putrescent matter, as well as the cheapest mode of keeping a town always clean. There would be less noxious or offensive effluvia, than is generated in spite of all the ordinary means of prevention; and by scraping up and removing the marl after it had combined with and secured enough of putrescent matter, a compost would be obtained for the use of the surrounding country, so rich and so abundant, that its use would repay a large part, if not the whole of the expense incurred in its production. Probably one covering of marl for each year would serve for most yards, &c., but if required oftener, it would only prove the necessity for the operation, and show the greater value in the results. The compost that might be obtained from spaces equal to five hundred acres in a populous town, would durably enrich thrice as many acres of the adjacent country: and after twenty years of such a course, the surrounding farms might be capable of returning to the town a ten fold increased surplus product. After the qualities and value of the manure so formed were properly estimated, it would be used for farms that would be out of the reach of all other calcareous manures. Carts bringing country produce to market might with profit carry back loads of this compost eight or ten miles. The annual supply that the country might be furnished with, would produce very different effects from the putrescent and fleeting manure now obtained from the town stables. Of the little durable benefit heretofore derived from such means, the appearance of the country offers sufficient testimony. At three miles distance from some of the principal towns in Virginia, more than half the cultivated land is too poor to yield any farming profit. The surplus grain sent to market is very inconsiderable—and the coarse hay from the wet meadows can only be sold to those who feed horses belonging to other persons—and to whom that hay is most desirable that is least likely to be eaten.

But even if the waste and destruction of manure in towns was counted as nothing, and the preservation of health by keeping the air pure was the only object sought, still calcareous earth, as presented by rich marl, would serve the purpose far better than quicklime. It is true, that the latter substance acts powerfully in decomposing putrescent animal matter, and destroys its texture and qualities so completely, that the operation is commonly and expressively called "burning" the substances acted on. But to use a sufficient quantity of quicklime to meet and decompose all putrescent animal matters in a town, would be intolerably expensive, and still more objectionable in other respects. If a cover of dry quicklime in powder was spread over all the surfaces requiring it for this purpose, the town would be unfit to live in; and the nuisance would be scarcely less, when

rain had changed the suffocating dust to an adhesive mortar. Woollen clothing, carpets, and even living flesh would be continually sustaining injury from the contact. No such objections would attend the use of mild calcareous earth: and this could be obtained probably for less than one-fifth of the cost of quicklime, supposing an equal quantity of pure calcareous matter to be obtained in each case. At this time the richest marl on James River may be obtained at merely the cost of digging, and its carriage by water, which if undertaken on a large scale, could not exceed, and probably would not equal three cents the bushel.

The putrescent animal matters that would be preserved and rendered innoxious by the general marling of the site of a town, would be mostly such as are so dispersed and imperceptible that they would otherwise be entirely lost. But all such as are usually saved in part, would be doubled in quantity and value, and deprived of their offensive and noxious qualities by being kept mixed with calcareous earth. The importance of this plan being adopted with the products of privies, &c. is still greater in town than country. The various matters so collected and combined should never be applied to the soil alone, as the salt derived from the kitchen, and the potash and soap from the laundry, might be injurious in so concentrated a form. When the pit for receiving this compound is emptied, the contents should be spread over other and weaker manure, before being applied to the field.

Towns might furnish many other kinds of rich manure, which are now lost entirely. Some of these particularly require the aid of calcareous earth to be secured from destruction by putrefaction, and others, though not putrescent, are equally wasted. The blood of slaughtered animals, and the waste and rejected articles of wool, hair, leathers, skin, horn and bones, all are manures of great richness. We not only give the flesh of dead animals to infect the air, instead of using it to fertilize the land, but their bones which might be so easily saved, are as completely thrown away. Bones are composed of phosphate of lime and gelatinous animal matter, and when crushed, form one of the richest and most convenient manures in the world. They are shipped in quantities from the continent of Europe to be sold for manure in England. The fields of battle have been gleaned, and their shallow graves emptied for this purpose: and the bones of the ten thousand British heroes who fell on the field of Waterloo, are now performing the less glorious, but more useful purpose of producing as manure bread for their brothers at home.

There prevails a vulgar but useful superstition, that there is "bad luck" in throwing into the fire any thing, however small may be its amount or value, that can serve for the food of any living animal. It is a pity that the same belief does not extend to every thing that as manure can serve to feed growing plants—and that even the parings of nails and clippings of beards are not used (as in China) in aid of this object. However small each particular source might be, the amount of all the manures that might be saved, and which are now wasted, would add incalculably to the usual means for fertilization. Human excrement, which is scarcely used at all in this country, is stated to be even richer than that of birds; and if all the enriching matters were preserved that are derived

not only from the food, but from all the habits of man, there can be no question but that a town of ten thousand inhabitants, from those sources alone, might enrich more land than could be done from as many cattle.

The opinions here presented are principally founded on the theory of the operation of calcareous manures, as maintained in the foregoing part of this essay; but they are also sustained to considerable extent by facts and experience. The most undeniable practical proof of one of my positions, is the power of a cover of marl to prevent the escape of all offensive effluvia from the most putrescent animal matters. Of this power I have made continued use for about eighteen months, and know it to be more effectual than quicklime, even if the destructive action of the latter was not objectionable. Quicklime forms new combinations with putrescent substances, and in thus combining, throws off effluvia, which though different from the products of putrescent matter alone, are still disagreeable and offensive. Mild lime on the contrary absorbs and preserves every thing—or at least prevents the escape of any offensive odor being perceived. Whether putrescent vegetable matter is acted on in like manner by calcareous earth, cannot be as well tested by our senses, and therefore the proof is less satisfactory. But if it is true that calcareous earth acts by combining putrescent matters with the soil, and thus preventing their loss, (as I have endeavored to prove in Chapter VIII.) it must follow that to the extent of such combination, the formation and escape of all volatile products of putrefaction will also be prevented.

But it will be considered that the most important inquiry remains to be answered: Has the application of calcareous manures been found in practice decidedly beneficial to the health of the residents on the land? I answer, that long experience, and the collection and comparison of numerous facts derived from various sources, will be required to remove all doubts from this question; and it would be presumptuous in any individual to offer as sufficient proof, the experience of only ten or twelve years on any one farm. But while admitting the insufficiency of such testimony, I assert that so far, my experience decidedly supports my position. My principal farm until within some four or five years, was subject in a remarkable degree to the common mild autumnal diseases of our low country. Whether it is owing to marling, or other unknown causes, these bilious diseases have since become comparatively very rare. Neither does my opinion in this respect, nor the facts that have occurred on my farm, stand alone. Some other persons are equally convinced of this change on other land as well as on mine. But in most cases where I have made inquiries as to such results, nothing decisive had been observed. The hope that other persons may be induced to observe and report facts bearing on this important point, has in part caused the appearance of these crude and perhaps premature views.

Even if my opinions and reasoning should appear sound, I am aware that the practical application is not to be looked for soon; and that the scheme of using marl in towns is more likely to be met by ridicule, than to receive a serious and attentive examination. Notwithstanding this anticipation, and however hopeless of making con-

verts either of individuals or of corporate bodies, I will offer a few concluding remarks on the most obvious objections to, and benefits of the plan. The objections will all be resolved into one—namely, the expense to be encountered. The expense certainly would be considerable; but it would be amply compensated by the gains and benefits. In the first place the general use of marl as proposed for towns, would serve to insure cleanliness, and purity of the air, more than all the labors of their Boards of Health and their scavengers, even when acting under the dread of approaching pestilence. Secondly, the putrescent manures produced in towns, by being merely preserved from waste, would be increased ten-fold in quantity and value. Thirdly, all existing nuisances and abominations of filth would be at an end, and the beautiful city of Richmond (for example) would not give offence to our nostrils, almost as often as it offers gratification to our eyes. Lastly, the marl after being used until saturated with putrescent matter, would retain all its first value as calcareous earth, and be well worth purchasing and removing to the adjacent farms, independent of the enriching manure with which it would be loaded. If these advantages can indeed be obtained, they would be cheaply bought at any price necessary to be encountered for the purpose.

The foregoing part of this chapter was first published in the *Farmers' Register*, (for July 1833) and as supplementary to this Essay. That publication drew some attention from others to the subject, and served to elicit many important facts, of which I had been before altogether ignorant, in support of the operation of calcareous earth in arresting the effects of *malaria*, or the usual autumnal diseases of the southern states and other similar regions. These facts, together with the result of my own personal experience, extended through two more autumns (or sickly seasons as commonly called here and farther south,) since the first publication of these views, will now be submitted. Most of the facts derived from other persons relate to one region—the “rotten limestone lands” of Southern Alabama: but that region is extensive, of remarkable and well known character and peculiarities, and the evidence comes from various sources, and is full, and consistent in purport. The facts will be here embodied, and the more important statements from which they are drawn, will be presented more fully in the Appendix. [See N.]

The first fact brought out, was, that in the town of Mobile, near the Gulf of Mexico, the streets actually had been paved with shells—thus presenting precisely such a case as I recommended, though not with any view to promoting cleanliness or health. The shells had been used merely as a substitute for stones, which could not be so cheaply obtained. Nor had the greatly improved healthiness of Mobile since the streets were so covered, (of which there is the most ample and undoubted testimony,) been attributed to that cause, until the publication of the foregoing opinions served to connect them as cause and effect. This can scarcely be doubted by those who will admit the theory of the action of calcareous earth—and the remarkable change from unhealthiness in Mobile, to comparative healthiness, is a very strong exemplification of the truth of the theory. But it is not strange, that when so many other causes might (and probably did) operate to arrest

disease, that none should have considered the chemical operation of the shelly pavement as one of them, and still less as the one by far the most important. The paving of streets, (with any material) draining and filling up wet places, substituting for rotting wooden buildings new ones of brick and stone—and especially the operation of destructive and extensive fires—all we know operate, (and particularly the last,) to improve the healthiness of towns: and all these operated at Mobile, as well as shelling the streets. Neither was the shelling so ordered as to produce its best effect for health. The streets, alleys, and many yards and small vacant lots were covered, and so far the formation and evolving of pestilential effluvia were lessened. But as this was not the object in view, and indeed the chemical action of shells not thought of, the process was incomplete, and must necessarily be less effectual than it might have been made. The shelling ought to have been extended to every open spot where filth could accumulate—to every back yard, in every cellar, and made the material of the floor of every stable, and every other building of which the floor would otherwise be of common earth. In addition, after a sufficient lapse of time to saturate with putrescent matters the upper part of the calcareous layer, and thus to make it a very rich compound, there should be a partial or total removal of the mass, and a new coating of shells laid down. The value of the old material, as manure, would probably go far towards paying for this renewal: and if it is not so renewed, the calcareous matter cannot combine with more than a certain amount of putrescent matters—and after being so saturated, can have no farther effect in saving such matters for use, or preventing them from having their usual evil course.

The burning of towns is well known to be a cause of the healthiness of the places being greatly improved, and that that effect continues after as many buildings, or more, have replaced those destroyed by fire. Indeed this improvement is considered so permanent, as well as considerable, that the most sweeping and destructive conflagrations of some of our southern towns, have been afterwards acknowledged to have proved a gain, and a blessing. The principal and immediate mode of operation of this universally acknowledged cause, is usually supposed to be the total destruction, by the fire, of all filth and putrescent matters—and in a less degree, and more gradually, by afterwards substituting brick and stone for wooden buildings, which are always in a more or less decaying state. But though these reasons have served heretofore to satisfy all, as to the beneficial consequences of fires, surely they are altogether inadequate as causes for such great and durable effects. The mere destruction of all putrescent matters in a town at any one time, would certainly leave a clear atmosphere, and give strong assurance of health being improved for a short time afterwards: but these matters would be replaced probably in the course of a few months, by the residence of as many inhabitants, and the continuance of the same general habits—and most certainly this cause would lose all its operation by the time the town was rebuilt. But there is one operation produced by the burning of a town, which is far more powerful—which in fact is indirectly the very practice which has been advocated

—and the effect of which, if given its due weight, furnishes proof of the theory set forth, by the experience of every unhealthy town which has suffered much from fire. If any estimate is made of the immense quantity of mild calcareous earth which is contained in the plastering and brickwork of even the wooden dwelling houses of a town, (and still more from those built of masonry) it must be admitted that all that material being separated, broken down, (soon or late,) and spread by the burning of the houses, and pulling down their ruins, is enough to give a very heavy cover of calcareous earth to the whole space of land burnt over. It is to this operation, in a far greater degree than to all others, that I attribute the beneficial effects to health of the burning of towns.

I proceed to the facts derived from the extensive body of prairie lands in Alabama which rest on a substratum of soft limestone, or rich indurated clay marl. It was from these remarkable soils that the specimens were obtained which were described at page 22. Some of these, indeed all that have been examined by chemical tests of the high and dry prairie lands, contain calcareous earth in larger proportions than any soils of considerable extent in the United States that I have seen or tested. The specimens not containing free calcareous earth are of the class of neutral soils; and the calcareous earth, which doubtless they formerly contained, and from which they derived their peculiar and valuable qualities, may be supposed only to be concealed by the accumulation of vegetable matter, according to the general views submitted in Chapter VII. The more full descriptions of the soils of this remarkable and extensive region which will be placed in the Appendix, [at N] render it unnecessary to enlarge much here. It will be sufficient to sum up concisely the facts there exhibited—and which agree with various other private accounts which have been received from undoubted sources of information. The deductions from these facts, and their accordance with the theory of the operation of calcareous matter, are matters of reasoning, and as such, are submitted to the consideration and judgement of readers.

The soil of these prairie lands is very rich, except the spots where the soft limestone rises to the surface, and makes the calcareous ingredient excessive: in the specimen formerly mentioned, the pure calcareous matter formed 59 parts in the hundred of this "bald prairie" land. The soil generally has so little of sand, that nothing but the calcareous matter which enters so largely into its composition prevents it being so stiff and intractable, that its tillage would be almost impracticable; yet it is friable and light when dry, and easy to till. But the superfluous rain water cannot sink and pass off, as in sandy or other pervious lands, but is held in this close and highly absorbent soil, which throughout winter is thereby made a deep mire, unfit to prepare for tillage, and scarcely practicable to travel over. This water-holding quality of the soil, and the nearness to the surface of the hard marly substratum, deprive the country of natural springs and running streams: and before the important discovery was made that pure water might be obtained by boring from 300 to 700 feet through the solid calcareous rock, the inhabitants used the stagnant rain water collected in pits,

which was very far from pure, or palatable. Under all these circumstances, added to the rank herbage of millions of acres annually dying and decomposing under a southern sun, it might have been counted on as almost certain, that such a country would have proved very unhealthy: yet the reverse is the fact, and in a remarkable degree. The healthiness of this region is so connected with, and limited by, the calcareous substratum and soil, that it could not escape observation: and they have been considered as cause and effect by those who had no theory to support, and who did not spend a thought upon the mode in which was produced the important result which they so readily admitted. Their testimony therefore is in this respect the more valuable, because it cannot be suspected. The intelligent author of the extract from the *Southern Agriculturist*, which will be given in the Appendix [N] is altogether unknown to me—and it is presumed that he had never heard of this essay, nor of these views of the action of calcareous earth.

After deducing the foregoing mass of evidence, for which I am indebted to others, it will appear very unimportant to add what will follow from my personal observation—especially, as the opinion has been expressed above, that the experience of any one individual, on any one farm, or in any one location, though continued for ten or twelve years, must be very insufficient as proof of a permanent change of healthiness, and of the actual causes of such changes. But, as in the absence of more striking facts, and of practical proofs, my own limited experience was formerly brought forward—it is proper here to add, that the two autumns that have since passed have brought no circumstances to weaken the opinions advanced, and many that have served, on the contrary, to strengthen them.

On my principal farm, Coggin's Point, the position of the homestead was always most inconveniently situated, and became the more so as the clearing and improvement of the poorer and more remote parts of the land were extended. For this reason, in addition to others, the farm buildings, and negroes' dwellings had been gradually removed, as the expense could be best encountered, until the old homestead was entirely abandoned in 1831, for a more eligible location. This would prevent the different degree of healthiness found here, before and since marling, from presenting a fair statement or proof. But still, there is no doubt of the general results showing a great and decided improvement in respect to health—and this was evident, before as well as since the removal of the dwelling place of the slaves. The greater number of these had been moved to an intermediate location, (with a view to health) before these benefits of marling were either felt, or anticipated—where a portion of them remained until within the last few years: and the circumstances attending this location, furnish ground for the opinion maintained, which is not liable to the objection referred to.

The poor farm (Shellbanks) which was made a summer residence for my family in 1828 and the two succeeding years, and a permanent dwelling place since 1831, was marled to the extent of 120 acres, including all the land around the houses, in 1828; and in a few succeeding years, the space marled amounted to more than 300 acres. During this time, the yard was covered heavily with marl

—and in 1832, when the approach of Asiatic cholera caused such alarm, the floor of the cellar of the house, (which is very damp,) the stable floor, and stable yard, were also covered, and every other vacant spot. In addition, the plan of collecting for manure all putrescent animal matters in a pit and covering or mixing them frequently with marl, has been pursued for several years, though not with as much care and economy as ought to be used. In this pit, for experiment as much as for profit, the carcasses of animals have been several times placed, and preserved (as before) from giving out any offensive odor, until their very slow decomposition was at an end, merely by the covering of marl. The health of the family, during the first two or three autumns, was about as good as on what are considered healthy places in the tide-water region of Virginia—all of which are more or less subject to bilious disorders in autumn, though deserving well (as indeed does the whole country) to be considered more than usually exempt from all other diseases. We had among the members of a large family, some intermittents, and some more severe bilious fevers during that time. But there has been a still greater and unlooked for improvement since—and for the last two years, I believe that all residing permanently at this place, have enjoyed as good health, as could be hoped for in any situation in the United States. Among the domestic servants and their young children, last autumn, there were a few slight agues, (which were attributed to some of those acts of imprudence to which negroes are so notoriously addicted, even if not necessarily exposed,) and which were scarcely worth notice, but as exceptions to the general healthiness. The land not being then tilled, there were no field laborers. Among my own family and other white persons who were permanent residents, there was not a single ague, or the slightest disease to be counted as one of climate, or proceeding from malaria. But I repeat, that many such facts are necessary, and much time, and the testimony of many different persons from various places to be brought together, before the causes can be fully admitted of such mysterious effects, as disease and its removal. It is to be hoped that the facts and deductions here presented, however defective, may, at least, serve to attract the attention of many other and more competent investigators to this highly important subject.

CHAPTER XX.

DIRECTIONS FOR DIGGING AND CARTING MARL.

The great deposit of fossil shells, which custom has misnamed marl, is in many places exposed to view in most of the lands that border on our tide-waters, and on many of their small tributary streams. Formerly, it was supposed to be limited to such situations: but since its value as a manure has caused it to be more noticed, and sought after, marl has been found in many other places. It is often discovered by the digging of wells, but lying so deep, that its value must be more highly estimated than at present, before it will be dug for manure. From all the scattered evidences of the

presence of this deposit, it may be inferred, that it lies beneath nearly every part of our country between the sea and the granite ridge which forms the falls of all our rivers. It is exposed, where it rises, and where cut through by the deep ravines of hilly land, and the courses of rivers—and concealed by its dips, and the usual level surface of the country. The rich tracts of neutral soil on James River, such as Shirley, Westover, Brandon, and Sandy Point, seem to have been formed by alluvion, which may be termed recent, compared to that of our district in general: and in these, no marl has been found, though it is generally abundant in the adjacent higher lands.* Fresh-water muscle shells are sometimes found in thin layers (from a few inches to two feet thick) both on those lands, and others—but generally near the surface, and always far above the deposit of sea shells, found under the high land. These two layers of different kinds of shells are separated by a thickness of many feet of earth, containing no shells of any kind. From these appearances, it would seem that this tract of country was, for ages, the bottom of the sea—then covered by earth—then the bottom of a fresh-water lake—and finally made dry land. Muscle shells are richer than the others, as they contain much gelatinous and enriching animal matter. On this account, the earth with which muscle shells are found mixed, is a rich black mould. Most persons consider these beds of muscle shells as artificially formed by the Indians, who are supposed to have collected the muscles, for food, and left the shells, where the fish were consumed. There are some strong reasons which may be adduced both to sustain and to oppose this opinion. But whatever may be the origin of these collections of muscle shells, it does not affect their qualities as manure for the soils in which they are found, or for others to which they may be removed.

Neither the fossil sea shells, nor the earth mixed with them are supposed to contain any putrescent matter—and this manure has been considered throughout this essay as being valuable *only as containing calcareous earth*. This, no doubt, is the only ingredient of any worth, in the great majority of cases. But sometimes there are other ingredients—which must be considered merely as exceptions to the general rule. One of these exceptions has already been stated, in the descrip-

*It seems however, from facts learned since the publication of the passage above, that marl is, or has been, below these alluvial lands, though only at considerable depths. This does not contradict the opinion expressed that no marl is to be found in such land. The deposits referred to were of much more ancient formation, and have been covered by the very different and peculiar bodies of land which now form not only the surface, but a depth as low as the level of the river. Benjamin Harrison, Esq., of Berkley, (a tract of such land as is above described,) has found on the river beach, and dug deeply into, a body of the earth described at page 49, which evidently was once full of shells, though now retaining neither shells nor any trace of carbonate of lime, except some few stony and insulated masses. It has also been very recently stated, that fossil shells have been found at the level of the river at Curl's Neck in Henrico. These are interesting facts, which ought to encourage searches for such deposits in every part of the low country.

tion of gypseous marl, (page 48:) and some others have been discovered since the publication of that statement. A kind of earth containing a large proportion of carbonate of magnesia, as well as of carbonate of lime, has been found in Hanover. Professor Rogers, of William and Mary College, has discovered in many of the marls of Lower Virginia, some proportion of the "green sand" of geologists, or what is itself called "marl," (another misapplication of that name,) in New Jersey, and which has there been found highly valuable as manure, though containing not a particle of the carbonate of lime, which constitutes the sole value of shells and calcareous manures in general. But however interesting may be the discovery of these different ingredients, and however valuable they may prove as manures, still they are not to be considered as treated of in this essay under any general observations on *marl*, which are intended to be applied simply to manure, the only useful ingredient of which, is the *carbonate of lime*. [Appendix O.]

More than forty kinds of sea shells are found in the beds of marl that I have worked without counting any of very small size. Many kinds would escape common observation, and still more would require the aid of a magnifying glass to be distinguished. Generally the shells are whole, but are much broken by digging, and the after operations. The white shells are rapidly reduced, after being mixed with an acid soil—but some gray kinds, as scallop, and a variety of oyster, are so hard as to be very long before they can act as manure. Some beds, and they are generally the richest, have scarcely any whole shells, but are formed principally of small broken fragments. Of course the value of marl as a manure depends in some measure on what kinds of shells are most numerous, and their state of division, as well as upon the total amount of the calcareous earth contained. The last is however by far the most important criterion of its value. The most experienced eye may be much deceived in the strength of marl, and still more gross and dangerous errors would be made by an inexperienced marler. The strength of a body of marl often changes materially in sinking a foot in depth—although the same changes may be expected to occur very regularly, in every pit sunk through the same bed. Whoever uses marl, ought to know how to analyze it, which a little care will enable any one to do with sufficient accuracy. The methods described in Chap. V. for ascertaining the proportions of calcareous earth in soils, will of course serve for the same purpose with marl. But as more minute directions may be necessary for many persons who will use this manure, and who ought to be able to judge of its value, an additional article on this subject will be given in the Appendix. [See P.]

For want of attention to this only safe guide, gross errors are often committed, and losses continually sustained. By relying on the eye only, I have known marl, or rather a calcareous sand, rejected as worthless, and thrown off at considerable cost of labor, to uncover worse marl below, where whole shells were visible: and on the contrary earth has been taken for marl, and used as such, which had no calcareous ingredient whatever. The best marls for profitable use are generally such as show the fewest whole shells, or even large

fragments—and would be passed by unnoticed in some cases, or considered only as barren sand, or equally worthless clay. But even if such mistakes as these are avoided, every farmer using marl, without analyzing specimens frequently and accurately, will lose by applying it in quantities either too great or too small.

If marl reaches the surface any where, it may be most easily found by examining the beds of streams passing through the lowest land, or deepest ravines. A few of the smallest particles of shells found there, will prove that the stream passes through marl somewhere above; and a careful examination continued towards the source, will scarcely fail to discover where the bed lies. Its usual direction is horizontal, or very little inclined—and therefore if discovered any where along the sides of a narrow valley, it may generally be found by digging on the opposite side, or elsewhere not very distant at the same elevation on the hill-side: and it is always nearer the surface on swells, or convex parts of the hill-side, than where it retreats and forms hollows. In the more level parts of the country, the marl sometimes is very near the surface of the lowest land, and yet is not visible any where. In such situations particularly, a cheap and convenient auger may be used with much advantage in searching for marl: and it is also useful to try the depth or quality of a bed, even when its surface has been found. This tool may be made by welding a straight stem, half an inch square and six or seven feet long, to a common screw auger of about one inch and a half bore. If it has been so much worn as to be useless as a carpenter's tool, it will serve for boring in earth. A cross-piece for a handle should be fixed to slide over the stem, and be fastened by a small screw at different elevations, as most convenient. Other pieces may be added to the stem, attached by joints, so as to bore twelve or more feet deep. Dr. W. Cocke of Sussex, to whom I am indebted for this simple but useful tool, was enabled by its use to find a very valuable bed of marl which was no where visible at the surface, and which he has since been using to great extent and advantage.

By proper examinations marl may be found at or near the surface through a vast extent of the tide-water region of the United States, where it has not yet been noticed. But still, under most lands it probably does not approach within twenty-five or thirty feet of the surface, and if reached by digging, would be covered by water, so as greatly to increase the difficulty of obtaining it from such depths. Will these obstacles always debar from the benefit of this treasure half the great region under which it lies? I think not: and though it would be ridiculous now to propose such undertakings, it will at some future time be found profitable to descend still greater depths for good marl: and shafts will be sunk and the water and marl drawn out by horse power, or by steam engines, and the excavation carried on in the same manner as is done in coal mines.

Our beds of marl are either of a blue, or a yellowish color. The color of the first seems to have some connexion with the presence of water, as this kind is always kept wet, by water slowly oozing through it. The yellow marl is sometimes wet, but more generally dry, and therefore easier

to work.* Unless very poor, all marls are sufficiently firm and solid for the sides of the pit to stand, when dug perpendicularly.

Where a bed of marl is dry and not covered by much earth, no directions are required for the pit work—except it be, that the pit should be long enough to allow the carts to descend to the bottom (when finished) and to rise out on a slope sufficiently gradual. This will prevent the necessity of twice handling the marl, by first throwing it out of the pit, and then into the carts, which must be done, if the pit is made too short, or its ends too steep, for the loads to be drawn out. No machine of contrivance will raise marl from the bottom of a pit, or a valley, so well as a horse-cart—and no pains will be lost, in enlarging the pit, and graduating the ascent out of it, to attain that object.

As marl usually shows on a hill-side, but little earth has to be moved to uncover the first pit. But the next, and each successive cover of earth, will be more thick, until it may be necessary to abandon that place and begin again elsewhere. But the quantity of covering earth need not be regarded as a serious obstacle, if it is not thicker than the marl below it. While that is the case, one pit completed will receive all the earth thrown from an equal space, for commencing another. When this proportion of earth is exceeded, it is necessary to carry it farther, by either carts or scrapers, and the labor is greatly increased.

For any extensive operation, it is much cheaper to take off a cover of earth, twelve feet thick, to obtain marl of equal depth, than if both the covering earth and marl were only three feet each. Whether the cover be thick or thin, two parts of the operation are equally troublesome, viz. to take off the mat of roots, and perhaps some large trees on the surface soil, and to clean off the surface of the marl, which is sometimes very irregular. The greater part of the thickest cover would be much easier to work. But the most important advantage in taking off earth of ten or more feet in thickness, is saving digging, by causing the earth to come down by its own weight. If time can be allowed to aid this operation, the driest earth will mostly fall, by being repeatedly undermined a little. But this is greatly facilitated by the oozing water, which generally fills the earth lying immediately on beds of wet marl. In uncovering a bed of this description, where the marl was to be dug fourteen feet, and ten to twelve feet of earth to remove, my labor was made ten-fold heavier, by digging altogether. The surface bore living trees, and was full of roots—there was enough stone to

*The blue color of marl is not caused by merely the presence of water, or there would be no wet yellow marl. When both blue and yellow marl are seen in the same bed, the blue is always at bottom—and the line of division between the colors is well defined, and there is seen no gradual change of one to the other. I have lately observed (in 1831) that as intense and perfect a blue color as marl has ever been known to have, was given to what had been dry yellow marl, by its being used as a thick flooring for a stable yard, and kept covered with the rotting manure, and penetrated by its liquid oozings, which the marl was there placed to save. It may be inferred from this fact, that blue marls have received their color from some vegetable extract or other putrescent matter, dissolved in the water passing through the bed.

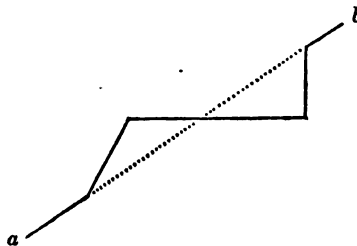
keep the edges of the grubbing hoes battered—and small springs and oozing water came out every where, after digging a few feet deep. A considerable part of the earth was a tough, sticky clay, kept wet throughout, and which it was equally difficult to get on the shovels, and to get rid of. Some years after, another pit was uncovered on the same bed, and under like circumstances, except that the time was the last of summer, and there was less water oozing through the earth. This digging was begun at the lowest part of the earth, which was a layer of sand, kept quite wet by the water oozing through it. With gravel shovels, this was easily cut under from one to two feet along the whole length of the old pit—and as fast as was desirable, the upper earth, thus undermined, fell into the old pit: and afterwards, when that did not take place of itself, the fallen earth was easily thrown there by shovels. As the earth fell separated into small but compact masses, it was not much affected by the water, even when it remained through the night before being shoveled away. No digging was required, except this continued shoveling out the lowest sand stratum, and whether clay, or stones, or roots, were mixed with the falling earth, they were easy to throw off. The numerous roots which were so troublesome in the former operation, were now an advantage, as they supported the earth sufficiently to let it fall only gradually and safely; and before the roots fell, they were almost clear of earth. The whole body of earth, notwithstanding all its difficulties, was moved off as easily as the driest could have been by digging altogether.

In working a pit of wet marl, no pains should be spared to drain it as effectually as possible. Very few beds are penetrated by veins of running water, which would deserve the name of springs—but water oozes very slowly through every part of wet marl, and bold springs often burst out immediately over its surface. After the form of the pit, and situation of the road are determined, a ditch to receive and draw off all the water, should be commenced down the valley, as low as the bottom of the pit is expected to be, and opened up to the work, deepening as it extends, so as to keep the bottom of the ditch on the same level with the bottom of the marl. It may be cheaper, and will serve as well, to deepen this ditch as the deepening of the pit proceeds. After the marl is uncovered the full size intended for the pit, (which ought to be large enough for carts to turn about on,) a little drain of four or five inches wide, and as many deep, (or the size made by the grubbing hoe used to cut it,) should be carried all around to intercept the surface or spring water, and conduct it to the main drain. The marl will now be dry enough for the carts to be brought on and loaded. But as the digging proceeds, oozing water will collect slowly; and aided by the wheels of loaded carts, the surface of the firmest marl would soon be rendered a puddle, and then quagmire. This may easily be prevented by the inclination of the surface. The first course dug off, should be much the deepest next the surface drain, (leaving a margin of a few inches of firm marl, as a bank to keep in the stream) so that the digging shall be the lowest around the outside, and gradually rise to the middle of the area. Whatever water may find its way within the work, whether from oozing, rain, or accidental burstings of the little surface

drain, will run to the outside, the dip of which should lead to the lower main drain. After this form is given to the surface of the area, very little attention is required to preserve it; for if the successive courses are dug of equal depth from side to side, the previous dip will not be altered. The sides or walls of the pit should be cut something without the perpendicular, so that the pit is made one or two feet wider at bottom than top. The usual firm texture will prevent any danger from this overhanging shape, and several advantages will be gained from it. It gives more space for work—prevents the wheels running on the lowest and wettest parts—allows more earth to be disposed of, in opening for the next pit—and prevents that earth tumbling into the next digging, when the separating wall of marl is cut away. The upper drain of the pit, which takes the surface water, will hang over the one below, kept for the oozing water. The former remains unaltered throughout the job, and may still convey the stream when six feet above the heads of the laborers in the pit. The lower drain of course sinks with the digging. Should the pit be dug deeper than the level of the receiving ditch can be sunk, a wall should be left between, and the remainder of the oozing water must be conducted to a little basin near the wall, and thence be baled or pumped into the receiving ditch. The passage for the carts to ascend from the pit should be kept on a suitable slope—and the marl forming that slope may be cut out in small pits, after the balance has been completed.

If the marl is so situated that carts cannot be driven as low as the bottom, then the area must be cut out in small pits, beginning at the back part, and extending as they proceed, towards the road leading out of the pit.

On high and broken land, marl is generally found at the bottom of ravines, and separated from the field where it is to be carried, by a high and steep hill-side. The difficulty of cutting roads in such situations, is much less than any inexperienced person would suppose. We cannot get rid of any of the actual elevation—but the ascent may be made as gradual as is desired, by a proper location of the road. The intended course must be laid off by the eye, and the upper side of the road marked. If it passes through woods, it will be necessary to use grubbing hoes for the digging. With these, begin at the distance of four or five feet below the marked line, and dig horizontally onward to it. That earth is to be pulled back with broad hoes, and laid over a width of three or four feet below the place from which it was taken.



Thus the upper side of the road is formed by cutting down, and the lower side by filling up, with the earth taken from above.

The annexed figure will prevent these directions being misunderstood. The straight line from *a* to *b* represents the original slope of the hill-side of which the whole figure is a section. The upper end of the dotted part of the line is in the mark for laying off the upper side of the road. The upper triangle is a section of the earth dug out of the hill-side, and the lower triangle, of the part formed by its removal. The horizontal line is the level of the road formed by cutting in on the upper, and filling up on the lower side. After shaping the road roughly, the deficiencies will be seen and may be corrected in the finishing work, by deepening some places and filling up others, so as to graduate the whole properly. A width of eight or nine feet of firm road, will be sufficient for carting marl.

If the land through which the road is to be cut is not very steep, and is free from trees and roots, the operation may be made much cheaper by using the plough. The first furrow should be run along the line of the lower side of the intended road, and turned down hill: the plough then returns empty, to carry a second furrow by the first. In this manner it proceeds—cutting deeply, and throwing the slices far, (both of which are easily done on a hill-side,) until rather more than the required width is ploughed. The ploughman then begins again over his first furrow, and ploughs the whole over as at first—and this course is repeated perhaps once or twice more, until enough earth is cut from the upper and put on the lower side of the road. After the first ploughing, broad hoes should aid and complete the work, by pulling down the earth from the high to the low side, and particularly in those places where the hill-side is steepest. After the proper shape is given, carts, at first empty, and then with light loads, should be driven over every part of the surface of the road, until it is firm. If a heavy rain should fall before it has been thus trodden, the road would be rendered useless for a considerable time.

Tumbril carts drawn by a single horse or mule, are most convenient for conveying marl short distances. Every part of the cart should be light, and the body should be so small as only to hold the load it is intended to carry, without a tail-board. This plan enables the drivers to measure every

load, which advantage will be found on trial much more important than would at first be supposed. If carts of common size are used, the careless laborers will generally load too lightly—yet sometimes will injure the horse by putting in a load much too heavy. The small-sized cart-bodies prevent both these faults. The load cannot be made much too heavy—and if too light, the farmer can detect it at a glance. Where there is a hill to ascend, five heaped bushels of wet marl is a sufficient load for a horse. If the marl is dry, or the road level, six bushels may be put in the same carts, by using tail-boards.

Strong laborers are required in the pit for digging and loading; but boys who are too small for any other regular farm labor, are sufficient to drive the carts. Horses or mules kept at this work soon become so tractable, that very little strength or skill is required to drive them.

All these hints and expedients, or perhaps better plans, would occur to most persons before they are long engaged in marling. Still these directions may help to smooth the obstructions in the way of the inexperienced—and they will not be entirely useless, if they serve to prevent even small losses of time and labor.

My task is at last completed. Whether I shall be able to persuade my countrymen to prize the treasures, and seize the profits which are within their reach, or whether my testimony and arguments shall be fruitless, soon or late, a time must arrive when my expectations will be realized. The use of calcareous manures is destined to change a large portion of the soil of Lower Virginia from barrenness to fertility—which, added to the advantages we already possess—our navigable waters and convenient markets, the facility of tilling our lands, and the choice of crops offered by our climate—will all concur to increase ten-fold the present value of our land, and produce more farming profit than has been found elsewhere on soils far more favored by nature. Population, wealth, and learning, will keep pace with the improvement of the soil—and we, or our children, will have reason to rejoice, not only as farmers, but as Virginians, and as patriots.

APPENDIX.

Part III.

Most of the articles which will be given in this Appendix, are deemed important to the parts of the Essay to which they refer, as furnishing more full explanation, or proof, of positions there maintained: but they are not absolutely essential to the text—and have therefore been thrown into this place and form, both for convenient reference, and to avoid interrupting the train of argument, or the connexion of facts, to those readers who may not need views so extended. But, though a regular recurrence to these notes may not be necessary as they are referred to in the foregoing text—and generally had better be postponed for an after and separate reading—still it is believed that most of them will be found either useful or interesting to those who may have read with approbation what precedes them. This form will be convenient both to those who may choose to pass over, as superfluous, any particular portions, and and to attract to these notes the attention of other readers, who may want the more full statements and proofs offered.

[NOTE A. Page 9.]

THE DIFFERENT IMPROPER SIGNIFICATIONS OF THE TERM "CALCAREOUS EARTH."

The definition of calcareous earth, which confines that term to the carbonate of lime, is certainly liable to objections, but less so than any other mode of arrangement. It may at first seem absurd to consider as one of the three principal earths which compose soils, *one* only of the many combinations of lime, rather than either pure lime alone, or lime in all its combinations. One or the other of these significations is adopted by the highest authorities, when the calcareous ingredients of soils are described—and in either sense, the use of this term is more conformable with scientific arrangement, than mine. Yet much inconvenience is caused by thus applying the term calcareous earth. If applied to *lime*, it is to a substance which is never found existing naturally, and which will always be considered by most persons as the product of the artificial process of calcination, and as having no more part in the composition of natural soils, than the manures obtained from oil-cake, or pounded bones. It is equally improper to include under the same general term all the combinations of lime with the fifty or sixty various acids. Two of these, the sulphate, and the phosphate of lime, are known as valuable manures; but they exist naturally in soils in such minute quantities, and so rarely, as not to deserve to be considered as important ingredients. A subsequent part of this essay will show why the ox-

late of lime is also supposed to be highly valuable as a manure, and far more abundant. Many other salts of lime are known to chemists: but their several qualities, as affecting soils, are entirely unknown—and their quantities are too small, and their presence too rare, to require consideration. If all the numerous different combinations of lime, having perhaps as many various and unknown properties, had not been excluded by my definition of calcareous earth, continual exceptions would have been necessary, to avoid stating what was not meant. The *carbonate of lime*, to which I have confined that term, though only one of many existing combinations, yet in quantity and in importance, as an ingredient of soils, as well as a part of the known portion of the globe, very far exceeds all the others.

But even if calcareous earth, as defined and limited, is admitted to be the substance which it is proper to consider as one of the three earths of agriculture, still there are objections to its name, which I would gladly avoid. However strictly defined, many readers will attach to terms such meanings as they had previously understood: and the word calcareous has been so loosely, and so differently applied in common language, and in agriculture, that much confusion may attend its use. Any thing "partaking of the nature of lime" is "calcareous," according to Walker's Dictionary: Lord Kames limits the term to *pure lime**—Davy† and Sinclair,‡ include under it pure lime and all its combinations—and Kirwan,§ Rozier,¶ and Young,§ whose example I have followed, confine the name calcareous earth to the carbonate of lime. Nor can any other term be substituted without producing other difficulties. *Carbonate of lime* would be precise, and it means exactly the same chemical substance: but there are insuperable objections to the frequent use of chemical names in a work addressed to ordinary readers. Chalk, or shells, or mild lime, (or what had been quicklime, but which from exposure to the air, had again become carbonated,) all these are the same chemical substance—but none of these names would serve, because each would be supposed to mean such certain form or appearance of calcareous earth, as they usually express. If I could hope to revive an obsolete term, and with some

*Gentleman Farmer, page 264, (2d Edin. Ed.)

†Agr. Chem. page 223, (Phil. Ed. of 1821.)

‡Code of Agriculture, page 134, (Hartford Ed. 1818.)

§Kirwan on Manures, Chap. 1.

¶"Terres"—Cours Complet d'Agriculture Pratique.

§Young's Essay on Manures, Chap. 3.

modification establish its use for this purpose, I would call this earth *calx*—and from it derive *calxing*, to signify the application of calcareous earth, in any form, as manure. A general and definite term for this operation is much wanting. Liming, marling, applying drawn ashes, or the rubbish of old buildings, chalk, or limestone gravel—all these operations are in part, and some of them entirely, that manuring that I would thus call *calxing*. But because their names are different, so are their effects generally considered—not only in those respects where differences really exist, but in those where they are precisely alike.

[NOTE B. Page 11.]

THE NAMES GIVEN TO SOILS BY WRITERS ON AGRICULTURE OFTEN INCORRECT AND CONTRADICTIONARY.

Nothing is more wanting in the science of agriculture, than a correct nomenclature of soils, by which the characters might be learned from the names—and nothing has hitherto seemed less attainable. The modes of classing and naming soils, used by scientific authors, are not only different, and opposed to each other—but each one of them is quite unfit to serve the purpose intended. As to the crowd of inferior writers, it is enough to say that their terms are not fixed by any rule—convey no precise meaning, and are worth not much more than those in common use among ourselves, and other practical cultivators, which often vary in their meaning within forty miles of distance. To enable us to judge of the fitness of the names given to soils by others, let us examine those applied by ourselves. We generally describe soils by making a mental comparison with those we are most accustomed to; and though such a description is understood well enough through a particular district, it may have quite a different meaning elsewhere. What are called *clay* or *stiff* soils in Sussex and Southampton, would be considered *sandy* or *light* soils in Goochland—merely because almost every acre of land in the former counties is sandy, and in the latter, clays are nearly as abundant.

The conflict of definitions, and consequent confusion of terms, cannot be more plainly set forth, than by quoting from some of the highest authorities, the various and contradictory explanations of a term, which is so common, that it is used by every one who writes or speaks of soils—and which, in some one or other sense, each writer probably considered as forming a very large, if not the greatest proportion of the cultivated soils of his country, and of the world.

"*Loam* denotes any soil moderately cohesive, and more so than loose chalk. By the author of 'the Body of Agriculture, it is said to be a clay mixed with sand.'" [Kirwan on Manures—Chap. 1.]

"*Loam*, or that species of artificial soil, into which the others are generally brought by the course of long cultivation."—"Where a soil is moderately cohesive, less tenacious than clay, and more so than sand, it is known by the name of 'loam. From its frequency, there is reason to suppose that in some cases it might be called an

"original soil." [Sinclair's Code of Agriculture—Chap. 1.]

"The word loam should be limited to soils containing at least one-third of impalpable earthy matter, copiously effervescing with acids." [Davy's Agricultural Chemistry—Lecture 4.] According to this definition by the most scientific writer and highest authority in chemical agriculture, if we except the small portion of shelly land, there is certainly not an acre of natural loam between the sea coast of Virginia and the Blue Ridge Mountains—and very few, if any, even in the limestone region.

"By loam is meant any of the earths combined with decayed animal or vegetable matter." [Appendix to Agr. Chem. by George Sinclair.]

"Loam—fat unctuous earth—marl." [Johnson's Dictionary, 8vo. Ed., and also Walker's.]

"Loam may be considered a clay of loose or friable consistency, mixed with mica or isinglass, and iron ochre." [Editor of American Farmer, Vol. III, page 320.]

[NOTE C. Page 13.]

SOME OF THE EFFECTS OF SLAVERY ON AGRICULTURAL PROFITS.

The cultivators of Eastern Virginia derive a portion of their income from a source quite distinct from their tillage—and which, though it often forces them to persist in their profitless farming, yet also, in some measure, conceals, and is generally supposed to compensate for its losses. This source of income is, the breeding and selling of slaves—of which, (though the discussion of this point will not be undertaken here,) I cannot concur in the general opinion that it is also a source of profit.

It is not meant to convey the idea that any person undertakes as a regular business the breeding of slaves with a view to their sale: but whether it is intended or not, all of us, without exception, are acting some part in aid of a general system, which taken altogether, is precisely what I have named. No man is so inhuman as to breed and raise slaves, to sell off a certain proportion regularly, as a western drover does with his herds of cattle. But sooner or later the general result is the same. Sales may be made voluntarily, or by the sheriff—they may be met by the first owner, or delayed until the succession of his heirs—or the misfortune of being sold may fall on one parcel of slaves, instead of another: but all these are but different ways of arriving at the same general and inevitable result. With plenty of wholesome, though coarse food, and under such mild treatment as our slaves usually experience, they have every inducement and facility to increase their numbers with all possible rapidity, without any opposing check, either prudential, moral, or physical. These several checks to the increase of population operate more or less on all free persons, whether rich or poor—and slaves, situated as ours are, perhaps are placed in the only possible circumstances, in which no restraint whatever prevents the propagation and increase of the race. From the general existence of this state of circumstances, the particular effects may be naturally deduced: and facts completely accord with what those circumstances promise. A gang of slaves on a farm will often in

crease to four times their original number, in thirty or forty years. If a farmer is only able to feed and maintain his slaves, their increase in value may double the whole of his capital originally vested in farming, before he closes the term of an ordinary life. But few farms are able to support this increasing expense, and also furnish the necessary supplies to the family of the owner—whence very many owners of large estates in lands and negroes, are throughout their lives too poor to enjoy the comforts of wealth, or to encounter the expenses necessary to improve their unprofitable farming. A man so situated, may be said to be a slave to his own slaves. If the owner is industrious and frugal, he may be able to support the increasing number of his slaves, and to bequeath them undiminished to his children. But the income of few persons increases as fast as their slaves—and if not, the consequence must be, that some of them will be sold, that the others may be supported; and the sale of more is perhaps afterwards compelled, to pay debts incurred in striving to put off that dreaded alternative. The slave first almost starves his master, and at last, is eaten by him—at least he is exchanged for his value in food. The sale of slaves is always a severe trial to their owner. Obstacles are opposed to it, not only by sentiments of humanity, and of regard for those who have passed their lives in his service—but every feeling he has of false shame comes to aid; and such sales are generally postponed, until compelled by creditors, and are carried into effect by the sheriff, or by the administrator of the debtor. But when the sale finally takes place, its magnitude makes up for all previous delays. Do what we will, the surplus slaves *must* be sent out of a country which is not able to feed them: and these causes continue to supply the immense numbers that are annually sold and carried away from Lower Virginia, without even producing the political benefit of lessening the actual number remaining. Nothing can check this forced emigration of blacks, and the voluntary emigration of whites, except increased production of food, obtained by enriching our lands, and the consequent increase of farming profits. No effect will more certainly follow its cause than this—that whenever our land is so improved as to produce double its present supply of food, it will also have, and will retain, double its present amount of population. The improving farmer who adds one hundred bushels of corn to the previous product of his country, effectually adds also to its population, as many persons as his increase of product will feed.

[NOTE D. Page 17.]

OPINIONS THAT SOILS ARE GENERALLY CALCAREOUS.

It was asserted that the inference to be drawn from all the descriptions of soils, in the most esteemed treatises on agriculture, is that *calcareous earth* is a very general, if not a universal ingredient. This assertion can be proved beyond all doubt, from European authors: but it would require many and long extracts, too bulky to include here, and which cannot be fairly abridged, or exhibited by a few examples. No author says direct-

ly that calcareous earth is present in all soils—but its being always named as one of the ingredients of soils in general, and no cases of its absolute deficiency being directly stated, amount to the declaration that calcareous earth is very rarely, if ever, entirely wanting in any soil. We may find enough directions to apply calcareous manures to soils that are deficient in that ingredient: but that deficiency, seems to be not spoken of as *absolute*, but *relative* to other soils more abundantly supplied. In the same manner, they direct clay, or sand, to be used as manure for soils very deficient in one or the other of those earths—but without meaning that any soil under cultivation, can be found entirely destitute of sand, or of clay. My proofs from general treatises, would therefore be generally indirect—and the quotations necessary to exhibit them, would show what had *not* been said, rather than what *had*—that they did *not* assert the absence of calcareous earth, instead of directly asserting its universal presence. Extracts for this purpose, however satisfactory, would necessarily be too voluminous, and it is well that they can be dispensed with. Better proof, because it is direct, and more concise, will be furnished by quoting the opinions of a few agriculturists of our own country, who were extensively acquainted with European authors, and have evidently drawn their opinions from those sources. These quotations will not only show conclusively, that their authors consider the received European doctrine to be that all soils are more or less calcareous—but also, that they apply the same general character to the soils of the United States, without expressing a doubt or naming an exception.

1st. From a "Treatise on Agriculture," (ascribed to General Armetrong,) published in the American Farmer. [Vol. I. page 153.]

"Of six or eight substances, which chemists have denominated earths, four are *widely and abundantly diffused*, and form the crust of our globe. These are silica, alumina, lime, and magnesia."—"In a pure or isolated state, these earths are wholly unproductive; but when decomposed and mixed, and to this mixture is added the residuum of dead animal or vegetable matter, they become fertile, and take the general name of soils, and are again denominated after the earth that most abounds in their composition respectively."

2. Address of R. H. Rose to the Agricultural Society of Susquehanna. [Am. Far. Vol. II. p. 101.]

"Geologists suppose our earth to have been masses of rock of various kinds, but principally silicious, aluminous, calcareous, and magnesian—from the gradual attrition, decay, and mixture of which, together with an addition of vegetable and animal matter, is formed the soil; and this is called sandy, clayey, calcareous, or magnesian, according as the particular primitive material preponderates in its formation."

3. Address of Robert Smith to the Maryland Agricultural Society. [Am. Far. Vol. III. p. 228.]

"—The soils of our country are in general clay, sand, gravel, clayey loam, sandy loam, and gravelly loam. Clay, sand, and gravel, need no description, &c."—"Clayey loam is a compound soil, consisting of clay, and sand or gravel, with a mixture of calcareous matter, and in which clay is predominant. Sandy, or gra-

"*velly loam*, is a compound soil, consisting of "sand or gravel, and clay, with a mixture of *calcareous matter*, and in which sand or gravel is "predominant."

The first two extracts merely state the geological theory of the formation of soils, which is received as correct by the most eminent agriculturists of Europe. How far it may be supported or opposed by the actual constitution, and number of ingredients of European soils, is not for me to decide, nor is the consideration necessary to my subject. But the adoption of this general theory, by American writers, without excepting American soils, is an indirect, but complete application to them, of the same character and composition. The writer last quoted, states positively that the various loams, (which comprise at least nineteen-twentieths of *our* soils, and I presume also of the soils of Maryland,) contain calcareous matter. The expression of this opinion by Mr. Smith, is sufficient to prove that such was the fair and plain deduction from his general reading on agriculture, from which source only could his opinions have been derived. If the soils of Maryland are not very unlike those of Virginia, I will venture to assert, that not one in a thousand of all the clayey, sandy, and gravelly loams, contains the smallest proportion of *carbonate of lime*—and that not a single specimen of calcareous soil can be found, between the falls of the rivers, and the most eastern body of limestone.

But though the direct testimony of European authors, (as cited in the essay,) concurs with the indirect proofs referred to in this note, to induce the belief that soils are very rarely destitute of calcareous earth, yet statements may be found of some particular soils being considered of that character. These statements, even if presented by the authors of general treatises, would only seem to present exceptions to their general rule of the almost universal diffusion of calcareous earth in soil. But so far as I know, no such exceptions are named in the descriptions of soils in any general treatise, and therefore have not the slightest effect in contradicting or modifying their testimony on this subject. It is in the description of soils of particular farms, or districts, that some such statements are made: and even if no such examples had been mentioned, they would not have been needed to prove the existence, in Europe, of some soils like most of ours, destitute of calcareous earth. These facts do not oppose my argument. I have not asserted, (nor believed, since I have endeavored to investigate this subject,) that there were not soils, and perhaps many extensive districts, containing no calcareous earth. My argument merely maintains that these facts would not be inferred, but the contrary, by any general and cursory reader of the agricultural treatises of Europe, that we are best acquainted with. It has not been my purpose to inquire as to the existence, or extent, of soils of this kind in Europe. But judging from the indirect testimony furnished by accounts of the mineral and vegetable productions in general descriptions of different countries, I would suppose that soils having no calcareous earth were often found in Scotland and the northern part of Germany, and that they were comparatively rare in England and France.

[NOTE E. Page 18.]

DIRECTIONS FOR ANALYZING MARL, AND OTHER CALCAREOUS SUBSTANCES.

It is unnecessary here to describe Professor Davy's apparatus for measuring the carbonic acid gas evolved from any given quantity of calcareous soil, (and of course of marl,) and thus ascertaining the proportion of the carbonate of lime contained. Without a plate, the description could not be made plain—and the expense of the apparatus would be a sufficient prohibition of the purchase to every reader who cannot easily refer to the original description in the *Elements of Agricultural Chemistry*.

Prof. W. B. Rogers, has recently invented, and has used successfully, a much cheaper apparatus, and which for trials of very small quantities of marl, is also much more correct. His description of this apparatus will be copied from the *Farmers' Register*, Vol. II. p. 364.

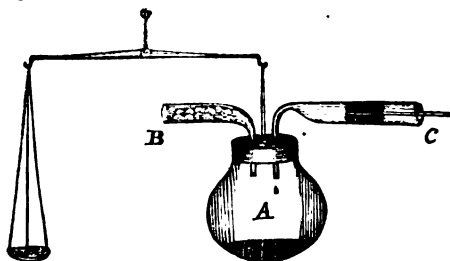
"The apparatus which I am about to describe, is intended to give greater accuracy and facility to the usual process for determining the quantity of carbonic acid in marl, or in any of the carbonates. By the common method, the two vessels containing severally the marl and the muriatic acid are placed in one of the scales of a delicate balance, and there counterpoised by weights put into the other scale. The acid is then poured upon the marl, and after all the carbonic acid has been discharged, the equilibrium is restored by adding weights to one, or abstracting them from the other scale. In principle, this method is entirely free from objection: but as usually conducted, it cannot be relied upon as accurate. This want of precision arises, in the first place, from the escape of aqueous vapor, along with the carbonic acid which is discharged, thus making a greater weight necessary for restoring the equilibrium, than is due to the quantity of carbonic acid which has escaped—and secondly, from the greater weight of the vessels containing the marl and acid impairing the sensibility of the balance, and thus rendering it impossible to estimate the carbonic acid to small fractions of a grain. The first of these objections has long been obviated in the chemical analysis of the carbonates, by causing the gas, as it escapes, to pass through a tube containing dried muriate of lime; and the latter has been in some measure removed, by a contrivance of the great practical chemist Rose; which, however, as it is inconvenient and uncertain in the manipulation, I shall not here describe.

"The apparatus which I have devised, is, I think, free from these objections, and enables the operator to proceed with great accuracy and despatch. It has the advantage of being very easily constructed, and of being used with a balance that can be procured at a very moderate price. Moreover, the quantity of marl which is necessary for experiment in no case exceeding ten grains, specimens for analysis may very easily be forwarded by letter.

"The balance which I use with this apparatus, is a small goldsmith's balance—such as may be procured for a few dollars in New York. It is very light, and turns, when unloaded, with the $\frac{1}{10}$ th of a grain. My set of weights obtained from Mill

lington in Philadelphia, extends to tenths and hundredths of the grain.

"The accompanying figure will convey a distinct idea of the apparatus and mode of using it. One of the scales is removed to admit of suspending the apparatus by a double thread over the hook of the beam. The other is made of something light, as a piece of card. In this way all unnecessary weight upon the beam is avoided, and its sensibility preserved.



"A, is a light bulb of glass, blown very thin from a common piece of tube, and about one inch in diameter. A cork is fitted to its mouth, and through this, the tapered ends of the bent glass tubes, B and C, are passed air tight; the extremity of the latter extending some distance into the vessel. The tube B, through which the gas escapes, is filled with fragments of muriatic of lime. The tube C, which contains the muriatic acid, is furnished with a light piston of cork or cotton, in the centre of which is fixed a rod or handle, made of a small stiff straw. This instrument, when charged with marl and acid, does not weigh more than 120 grains. The whole load of the beam is therefore 240 grains, and it is still sensible to the $\frac{1}{100}$ th of a grain.

"The mode of proceeding with the analysis is as follows. Five or ten grains of the finely powdered marl is introduced into the vessel A, and then two or three drops of water added, to assist the diffusion of the acid. The small end of the tube C, now removed from the cork, is dipped into some muriatic acid in a wine glass, and the piston moved backwards and forwards until the necessary quantity of acid has been drawn in. The tube is then replaced in the cork, and in this state the instrument is counterpoised by weights in the opposite scale. The piston being then gradually forced in, the acid is injected, drop by drop, upon the marl, and the gas escapes by the tube B, depositing the aqueous vapor in its passage, on the muriate of lime. Allowing the apparatus to rest until the gas has entirely escaped, and the decomposition is complete, the equilibrium is restored by placing weights upon the clear top of the cork, or by removing weights from the scale. In this way the weight of the disengaged gas is accurately determined, and the proportion of carbonate of lime thence computed.

"An analysis of a specimen of marl from James City, just completed, will serve as an illustration of the method. Ten grains of the finely powdered marl was introduced with a little water into the vessel A, the instrument was then charged and counterpoised. The acid being injected, the whole was allowed to rest for an hour. The weight lost was 2.91 grains. Increasing this in the ratio of 14 to 100, gives 6.61 grains of carbonate of lime

in the 10 grains of marl—or almost precisely 66 per cent.

"The frequent calls upon me for the analysis of specimens of marl, first led me to the construction of this apparatus; and I have since found it so convenient and accurate, that I can recommend its adoption to such of your readers as may have a taste for chemical inquiries connected with agriculture. Any ordinary worker in glass will construct the instrument, and skill in manipulating with it may be soon and easily acquired.

WM. B. ROGERS."

The principle upon which the apparatus works, is the same as that of the more expensive and complicated apparatus of Davy, (described in his *Agricultural Chemistry*) which I had previously considered the best—that is by separating and ascertaining the weight of the carbonic acid combined with the lime of the manure. Every hundred grains of calcareous earth or carbonate of lime, is composed always of similar proportions of lime and of carbonic acid—which proportions, by weight, are 56 parts of lime, and 44 of carbonic acid. Of course, if we know how much weight is lost in 100 grains of earth partly of carbonate of lime, (as marl,) by driving off its carbonic acid, the rule of proportion will show what was the amount of carbonate of lime contained in the sample of earth.

When the muriatic acid reaches the earth in the bulb, it immediately combines with the lime by its greater attraction, and the weaker (carbonic) acid is disengaged in the form of gas, and escapes into the air through the tube containing the dry muriate of lime—which substance attracts moisture so powerfully, as to retain all that might otherwise pass out with the gas. The same muriate of lime will serve for many experiments, as by being heated in the tube, its dryness is restored previous to every trial. This salt is formed by the combination of muriatic acid with lime—and therefore every experimenter may provide it for himself, by filtering and evaporating the fluid left in this process of decomposing carbonate of lime.

Mr. Rogers has since informed me that a small portion of dry and lightly carded cotton will serve as well as the muriate of lime for arresting the moisture.

The mode of analyzing by solution and precipitation, though not to be trusted for operations where great exactness is required, and although much more troublesome than the using of either Davy's or Rogers' apparatus, is sufficiently correct for testing the strength of marl: and it has the advantage of requiring no apparatus, except a glass funnel, some blotting paper, and a set of small physic scales and weights—and no other tests than muriatic acid and carbonate of potash—all of which may be obtained at any apothecary's shop. The directions which follow, will be given with so much minuteness, that any attentive reader may both understand and follow them in practice, though totally unacquainted previously with chemical terms and processes. These directions also first appeared in the *Farmers' Register*, Vol. I. p. 609.

"1st. Take a lump of marl, fossil shells, &c. large enough to furnish a fair sample of the particular body under consideration—dry it perfectly, near the fire—pound the whole to a coarse powder (in a metal mortar,) and mix the whole to-

gether. Take from the mixture a small sample, which reduce to a finely divided state, and weigh of it a certain portion, say 50 grains, for trial.

2nd. To this known quantity in a glass, pour slowly and at different times, muriatic acid diluted with three or four times its bulk of water—(any except limestone, or *hard* water.) The acid will dissolve all the lime in the calcareous earth, and let loose the carbonic acid with which it was previously combined, in the form of gas, or air, which causes the effervescence, which so plainly marks the progress of such solution. The addition of the muriatic acid, must be continued as long as it produces effervescence; and but very little, after that effect has ceased. The mixture should be well and often stirred, and should have enough excess of acid to be sour after standing thirty or forty minutes. (So much of the acid as the lime combines with, loses its sour taste, as well as its other peculiar qualities.)

3rd. The mixture now consists of 1. the lime combined chemically with muriatic acid, forming *muriate of lime*, which is a *salt*, and which is dissolved in the water—2. a small excess of muriatic acid, mixed with the fluid—and 3. the sand, clay, and any other insoluble parts of the sample of marl. To separate the solid from the fluid and soluble parts, is the next step required.

Take a piece of filtering or blotting paper, about six or eight inches square, (some spongy and unsized newspapers serve well,) fold it so as to fit within a glass funnel, which will act better if its inner surface is fluted. Pour water first into the filter, so as to see whether it is free from any hole, or defect—if the filtering paper operates well, throw out the water, and pour into it the whole mixture. The fluid will slowly pass through into a glass under the funnel, leaving on the filter all the solid parts, on which, water must be poured once or twice, so as to wash out, and convey to the solution, every remaining particle of the dissolved lime.

4th. The solid matter left, after being thus washed, must be taken out of the funnel on the paper, and carefully and thoroughly dried—then scraped off the paper and weighed. The weight, say 27 grains, being deducted from the original quantity, 50, would make the part dissolved (50—27=23,) $\frac{46}{100}$ of the whole. And such may be taken as very nearly the proportion of calcareous earth (or carbonate of lime) in the compound examined. But as there will necessarily be some loss in the process, and every grain taken from the solid parts, appears in the result as a grain added to the carbonate of lime, it will be right in such partial trials to allow about two per cent. for loss, which allowance will reduce the foregoing statement to $\frac{44}{100}$ of carbonate of lime.

5th. But it is not necessary to rely altogether on the estimate obtained by subtraction, as it may be proved by comparison with the next step of the process. Into the solution (and the washings) which passed through the filter, pour gradually a solution of *carbonate of potash*, (salts of tartar.) The first effect of the alkaline substance thus added, will be to take up any excess of muriatic acid in the fluid—and next, to precipitate the lime (now converted again to carbonate of lime,) in a thick curd-like form. When the precipitation is ended, and the fluid retains a strong taste of the carbonate of potash, (showing it to remain in ex-

cess,) the whole must be poured on another filtering paper, and (as before,) the solid matter repeatedly washed by pouring on water, then dried, scraped off, and weighed. This will be the actual proportion of the calcareous part of the sample, except, perhaps a loss of one or two grains in the hundred. The loss, therefore, in this part of the process apparently lessens, as the loss in the earlier part increases the statement of the strength of the manure. The whole may be supposed to stand thus—

$$\begin{array}{rcl} 27 \text{ grains of sand and clay.} & & \\ 21 \text{ — of carbonate of lime.} & \} & = 50. \\ 2 \text{ — of loss.} & & \end{array}$$

If the loss be divided between the carbonate of lime and the other worthless parts of the manure, it will make the proportions 28 and 22, which will be probably near the actual proportions.

The foregoing method is not the most exact, but is sufficiently so, for practical use. All the errors to which it is liable, will not much affect the reported result—unless magnesia is present, and that is not often in manures of this nature. Magnesia is never found (I believe,) in the collections of fossil shells—nor have I known of its presence in any of the earthy manures, except limestone, and the magnesian marl lately discovered in Hanover. If any considerable proportion of carbonate of magnesia should be present in marl tried by the foregoing method, it may be suspected by the effervescence being very slow, compared to that of carbonate of lime alone: and the proportions of these two earths may be ascertained as follows. The magnesia as well as the lime would be dissolved by the muriatic acid, (applied as above directed,) but the magnesia would not be precipitated with the carbonate of lime, but would remain dissolved in the alkaline solution, last separated by filtering. If this liquor is poured into a Florence flask, and boiled for a quarter of an hour, the carbonate of magnesia will fall to the bottom, and may then be separated by filtering and washing, and its quantity ascertained, by being dried and weighed. This part of the process may be easily added to the foregoing—but it will very rarely be required."

If desired, the proportions of silicious and aluminous earth may be ascertained, with enough truth for practical use, by stirring well these parts (minutely divided,) in a glass of water, and after letting it stand a minute, for the sand to subside, pouring off the fluid into another glass. The sand will be left, and the aluminous earth, or pure clay, pass off with the water—and each may be collected and dried on filtering paper, and weighed.

[NOTE F. Page 27.]

PROOFS OF THE EXISTENCE OF ACID SOILS, FURNISHED BY THE RECENT RESEARCHES OF CHEMISTS.

The *Traité de Chimie* is a French translation by Esslinger, of the voluminous and valuable work of the great Swedish chemist Berzelius. The original work and the French translation were in the course of publication at the same time; and the first volumes of the latter were published at Paris, before the latter volumes of the original

work had been sent to the press at Stockholm. The sixth volume of the French translation, from which the following extract is translated into English, was printed in 1832. It is not known whether the original work is in this country.

The following passages contain the opinions of Berzelius, and of other chemists, on humin, and humic acids, or as called here, *geine* and *geic acid*, and which were referred to in the quotation from Rennie, at page 28. It will be left to the reader to decide, how far my views of acid soils are supported by these opinions of chemists, founded upon chemical analyses of the substances in question. It is proper to state, that this new doctrine of geic or humic acid has not passed uncontroverted. It is altogether denied by Raspail, a French chemist, and who is a later writer than Berzelius.

Extracts translated from the *Traité de Chimie*.

PRODUCTS OF PUTREFACTION AT THE SURFACE OF THE EARTH.

Mould [terreau.]

The vegetable matters which rot at the surface of the earth, finish by leaving a blackish brown pulverulent mass, which has received the name of *mould*, [humus.]

All the vegetation of a year, which dies at the arrival of winter, is converted by degrees to mould, which is mixed with the earth in which the plant grew: whence it comes that the extreme surface of the earth contains a greater or less proportion of mould, which serves for the nutriment of the succeeding growth of plants. This mould, such as it is found in the earth, is often mingled with the products of a less advanced putrefaction, or even with vegetable parts not changed, principally, a great quantity of small roots. If we examine the mould, such as it is found in cultivated soils, it is found to be in a mass very much mixed; but it is always possible to extract the parts which characterize mould.

During the transformation of the vegetable matters to mould, the first portion of their mass is changed into a brownish black substance, which presents all the characters of *apotheme*,* when we have separated from it the unaltered *extract*, which the apotheme draws with it. The salts of such acids as are of organic origin, contained in the vegetable matter, are destroyed, so that the elements of the acid are resolved into water and carbonic acid, whilst the base is combined with the substance analogous to apotheme, which makes part of the mould. The salts of acids of mineral origin are preserved, unless they are soluble, in which case the rain carries them off. In addition, mould contains a substance but slightly soluble in water, which colors the liquid yellow, and a carbonaceous substance which is entirely insoluble, and which appears to be one of the products of a destruction, still more advanced, of organic matters.

To give an example of a completed formation of a mould of vegetable origin, I shall here state the results of an analysis to which Bracannot submitted some wheat, which had remained during

many centuries in a damp vault, the issues from which were stopped up by earth, and of which the existence was forgotten, until by chance it was again discovered. The grains had preserved their form, and the brightness of their outside skin; but they were black, and were reduced by the slightest pressure to a black powder. The water with which they were boiled was colored yellow, and it left, after being evaporated, a saline mass of a brownish yellow, which burnt with slight explosion when heated, and which, besides the substance cited, soluble in water, contained nitrate of potash, nitrate of lime, and a little of the muriates of potash and of lime. The nitrates were the result of the oxydation of the nitrogen contained in the gluten and vegetable albumen, and of the combination of the nitric acid thus produced, with the bases previously combined with vegetable acids. The weight of this mass soluble in water, including the salts and all the other principles, did not exceed $1\frac{1}{2}$ per cent. of the weight of the black grain. When the part insoluble in water was boiled in alcohol, a small trace of a brown substance was taken up, which remained after evaporating the alcohol, and had the consistence of wax. The mass, exhausted of its soluble parts by boiling water and alcohol, was then heated slowly with a weak solution of caustic potash, which became saturated and colored of a blackish brown; and this treatment was continued as long as new potash lie took up any thing. This substance was precipitated from the solution by an acid: it was the body similar to *apotheme* which has already been mentioned, and of which the weight amounted to $26\frac{1}{2}$ per cent. The portion of matter insoluble in the alkali preserved the same appearance. This exposed to the action of diluted muriatic acid, yielded to it a certain quantity of lime, of oxide of iron, and of phosphate of lime. The residue was again acted on by potash, which took up a new and very large proportion of the body similar to *apotheme*. This was, after that, combined with lime, and resisted in that state the action of potash. This calcareous combination amounted to 42 hundredths. The 30 per cent. remaining consisted of a black carbonaceous matter, insoluble in the solvent used.

If cultivated soil is treated in the same manner, similar results will be obtained, with this difference, that the earthy matter of the soil is found mixed with the products which are obtained, whilst no soluble salts are met with, they being generally carried off by the rains.

To describe the constituent principles of mould, it is necessary to designate them by particular names. I will then call *extract of mould* the body soluble in water, and I will give the name of *geine** to the matter similar to apotheme, which constitutes the principal mass of mould. As to the coally substance insoluble in water, alcohol, acids and alkalis, I will designate it by the name of *carbonaceous mould*.

Extract of mould.

We obtain this substance by drawing it from the mould by the action of cold water, which becomes thereby colored yellow, and which leaves after evaporation, a yellow extract of a bitter taste, and from which some *geine* is separated when it

*What Berzelius calls apotheme, is "a deposit slightly soluble in water, produced in an aqueous solution of vegetable extract during slow evaporation, and containing a larger proportion of carbon, than does an equal weight of extract."

*Or *humin*, as termed by other authors.

is again acted on by water. If this solution is left to evaporate spontaneously, in contact with air, it becomes covered with an insoluble pellicle, and when a certain degree of concentration has been reached, the liquor becomes turbid. The solution is precipitated by the salts of tin and of lead: after the precipitation, the liquor is without color. According to Korte, the sulphuretted hydrogen gas precipitates it also. This extractive matter is contained in the water of many springs and streams. The water of the springs of Porla in Westrogotha, contains so great a quantity that it is colored yellow. When the iron contained in this water is oxydized from the air, the extract of mould is precipitated with the oxide of iron, and the water becomes clear.

Geine.

This substance has received different names. Bracannot has given to it the name of *ulmin*, for reasons which I have exhibited and opposed in a former part of this work. Dobereiner and Sprengel gave to it the name of *acid of humus*, because it combines with the earths and alkalis. But for the same reason we might give the name of *acid* to more than the half of all vegetable bodies.

Geine does not exist in vegetable earth only; soot contains it also, and according to Bracannot, it is formed when the saw-dust of wood is exposed to the action of caustic potash. It is almost impossible to obtain geine in a state of purity. One part of the geine which is met with in a natural state, is in combination with bases; but when we attempt to remove these by an acid, the geine combines in part with the excess of acid, and acquires itself (in part) the property of reddening vegetable blues. Geine possesses all the properties of apotheme, and it is produced like other apothemes; that is to say, by the action of the air on dissolved extract of mould. In its natural state it does not act chemically, either like the acids or the alkalis, nor does it have any effect on the color of vegetable blues. It is but slightly soluble in water, which it colors of a pale yellow; is still less soluble in alcohol, and insoluble in ether. Exposed to the action of heat it takes fire, burns at first with flame, then without flame like spunk, spreading a peculiar odor, something like that of burning peat. Submitted to dry distillation, it is decomposed, gives half its weight of a charcoal having a metallic lustre, of empyreumatic oil, an acid water containing acetic acid and sometimes ammonia, some carburetted hydrogen, and a little carbonic acid gas. If geine is held suspended in water, through which a current of chlorine is passed, this whitens it, and precipitates a white resin-like substance. Iodine is without action on it. If we add an acid to an alkaline solution of geine, the geine is precipitated. If the whole of the geine is not precipitated, that part which is precipitated retains in combination a small portion of the base, and leaves, when it is burnt, a small quantity of alkaline ashes. If, on the contrary, an excess of acid is poured into the alkaline solution, the liquor is discolored, and the precipitated geine strongly reddens vegetable blues, a property which cannot be removed by placing the geine on a filter, and pouring water upon it. So long as the liquor which passes through the filter contains free acid, it is not colored; then it begins to be colored, and finally it dissolves as much as two-

thirds of its weight of the precipitated mass. These acid properties belong in part to the geine, which owes them to the action of the alkali, and which may, in this case, be called *geic acid*; they ought to be in part attributed to a combination of the geine with the precipitated acid. According to Einhoff, it is the latter case which is really presented, and the acid cannot be carried off, but with the aid of an alkali. Sprengel, on the other hand, pretends to have freed the geine, by prolonged washings, from the muriatic acid which had served to precipitate it: and to make certain the absence of the muriatic acid, he has mixed the washed geine with a little nitrate of silver. After evaporation to dryness, and calcination, the residue, treated by nitric acid, was dissolved, without leaving any muriate of silver. But as muriate of silver, like the other salts of silver, is reduced to a metallic state by bodies containing carbon and hydrogen, and carbon itself effects the same change when disengaged along with water, this result proves nothing. In general, in the descriptions of geine, they have attributed the properties of that which has been changed by the action of an alkali, to the geine which has not been altered. The geine which reddens vegetable blues, is the same, whatever may have been the acid which served for its precipitation. Its saturated aqueous solution is of a yellowish brown, and the combination is precipitated anew by acids, excepting the carbonic, and the sulphuretted hydrogen. Collected upon a filter, it is presented under the form of a gelatinous mass, of a taste slightly acid, astringent—and by drying, it contracts strongly, and forms clots of a deep brown, almost black, with a vitreous fracture, and which are not dissolved again in water after being once completely dried. The aqueous solution of the acid geine, is precipitated by the salts of lead, of tin, and of iron; but is not disturbed by gelatine, albumen, starch, gum, tannin, or solution of soap. According to Bracannot, it is precipitated by a mixture of the solution of gelatine and gallic acid. The dried geine is dissolved with difficulty, and incompletely, in alcohol. The solution reddens vegetable blues, whilst the part not dissolved is without this power, though it still preserves the property of combining with potash. Geine is destroyed by concentrated acids. The sulphuric acid dissolves it, taking at the same time a black color, carbonizing it, disengaging sulphurous acid gas, and leaving for residue the ordinary products which result from the action of this acid. By the addition of sur-oxide (or black oxide) of manganese, carbonic acid gas is disengaged. The nitric acid dissolves and decomposes geine, with a disengagement of nitric oxide gas, and carbonic acid gas. If the solution is evaporated to the consistence of sirop, and then mixed with water, there is precipitated a peculiar bitter substance in powder, and there are found in the solution, artificial tannin and oxalic acid.

Geine forms soluble combinations with alkalis. When an excess of geine is used, the caustic alkalis are so neutralized by this substance, that they lose their peculiar chemical action and properties. In this respect geine agrees with gluten, vegetable albumen, the brown of indigo, the sugar of liquorice, apotheme, and other bodies not acid. During the evaporation, the solution furnishes a black mass, which acquires lustre by complete drying, and splits, and is easily reduced to a powder. It

is re-dissolved in water, its taste is weak, bitter and disagreeable. Caustic ammonia gives a like mass, soluble in water, which gives up, during evaporation, the excess of alkali employed. Geine is not dissolved always in alkaline carbonates; when it is so dissolved, these carbonates are transformed, half into *geates*, half into bi-carbonates. When the solution is boiled, the bi-carbonate is decomposed with disengagement of carbonic acid gas, and in this manner the geine drives off all the carbonic acid. If a solution of geine in carbonate of ammonia, is evaporated, a residue is obtained containing neutralized geate of ammonia. The solution of geine in caustic potash in excess, absorbs oxygen from the air, and at the end of some time, the alkali is in part carbonated.

Geine forms with the *alkaline earths* pulverulent combinations but little soluble, which have an external resemblance to geine. The best means for obtaining them, is to mix a solution of the geate of ammonia, with the solution of an earthy salt; the combination of the geine with the earth is precipitated, and may be separated by filtration, from the supernatant fluid. In the humid state, these compounds are slightly soluble in water. According to the experiments of Sprengel, one part of *geate of barytes* is dissolved in 5200 parts of water, one part of *geate of lime* is soluble in 2000 parts of water, and one part of *geate of magnesia*, in 160 parts of water, cold. These same compounds require for their solution, rather smaller proportions of boiling water. After having been completely dried, they will no more dissolve. In the air, the base is combined in part with carbonic acid, and the carbonate which results therefrom, remains in the state of mixture with a combination of geine, and of a base analogous to a super-salt. The alkaline carbonates decompose the earthy *geates*; they dissolve the geine, and leave the base in the state of carbonate. According to Sprengel, the *geates of lime* and *magnesia* are dissolved in the caustic fixed alkalis, and in the carbonate of ammonia. Other chemists have not arrived at the same result; and according to them, the geate of potash, acted on by the hydrate of lime, precipitates all the geine. The *geate of alumina* is precipitated when a solution of alum is mixed with a solution of geate of potash, or of ammonia. This compound is dissolved in 4200 parts of cold water. In the moist state it is dissolved easily, and in abundance, in the alkaline carbonates and hydrates, and even in ammonia. According to Sprengel, it resists the decomposing action of acids, so that it is difficult to extract from it geine exempt from alumine. A combination is obtained having an excess of alumine, by digesting a solution of the geate of ammonia with hydrate of alumina. *

Carbonaceous mould.

The substance to which this name has been given has been but little examined. It is insoluble in alkaline liquors. Its color is a brown, almost black. Placed in contact with a body in combustion, it takes fire, and burns without flame like spunk. According to the experiments of Th. de Saussure, carbonaceous mould combines with the oxygen of the air, and forms carbonic acid gas, and when it is left a long time exposed to air and water, it becomes by slow degrees soluble in alkalis. The acids precipitate it

from the alkaline solution, in the state of acid geine. When cold, the sulphuric acid has but little effect on it. According to Bracannot, the nitric acid converts it, at a gentle heat, to a brown liquor, in which water produces a precipitate of a chocolate color, which possesses the properties of acid geine, and is dissolved without residue, in the alkalis.

Soil [terre végétale.]

It is the mixture of these several substances with the upper layer of the surface of the earth, which constitutes the *vegetable earth*, or *soil*, properly so called. Arable land is a bed of this soil, placed upon a bed of earth which contains no mould. Its fertility depends upon the quantity of mould which it contains. Growing plants continually diminish the quantity of geine contained in the soil; and when the plants are carried off from the soil on which they grew, which happens almost always with cultivated land, it is finally exhausted to that degree as to produce nothing. It is on this account that it is necessary to manure land. The matters discharged and left by animals, or the barn-yard manure which is used for this purpose, are by degrees converted into geine, and thus replace the matters dissipated by vegetation. Botanists who have directed their attention to vegetable physiology, have remarked that the plants vegetate well enough without geine, until the time arrives for them to commence their sexual functions. But as soon as these are ended, and the fruit begins to be developed, the plants absorb a great quantity of the nutritive principles contained in the soil, and if these are not in the soil, the flower falls without forming any fruit. The experiments to which Th. de Saussure has submitted soil, [*terre végétale*] appear to demonstrate that the three constituent principles of mould, may be converted the one to the other, under the alternately preponderating influence of air and water. Water converts to the *extract of mould* a part of the insoluble *geine* contained in the soil, and this transformation extends more and more, so that finally the greater part of the geine becomes soluble. In contact with the air, the dissolved matter passes again to the state of geine. The *carbonaceous mould* which changes a part of the air into carbonic acid, is itself changed by air into geine, and into the extract of mould, and it is upon this transformation that appear to depend in part the advantages derived from the tillage of the soil, which is divided by the action of the plough, and exposed to the immediate influence of the air. In this manner all the parts of the soil contribute to nutrition; whilst it is probable that the solution of the extract of mould, that of the geate of lime, and perhaps also that of the geate of alumine, are immediately absorbed by the roots. During a heavy rain, this solution penetrates the interior, and often to very deep beds of the steril earth; but notwithstanding that, it is not lost to vegetable life: for the roots of trees seek it, and bring it back as matter suitable for their nourishment.

Experience has demonstrated that quicklime, and the carbonate of lime, mingled with the soil, favor the vegetation produced thereon. Chemistry has not yet explained, in a satisfactory manner, the power which lime thus exerts; however, it is known that when the soil contains this alkaline earth, or, in its place, ashes only, the mould is

quickly consumed, and vegetation becomes more rich in proportion. It has thence been concluded that lime acts, partly in exciting the plant to greater activity, and partly in rendering more soluble the principles of the soil, which are absorbed by the roots when dissolved in the water which the earth has imbibed. Lime is not then a true [or alimentary] manure. It contributes only to promote and hasten the absorption of the principles which serve to nourish the plant; and that lime may be serviceable, it is necessary to introduce into the soil, improved by lime, materials proper to furnish new quantities of mould. The lime, or the alkali contained in ashes, acts also in hastening the change of organic matters to mould.

It is known by experience, that gypsum also augments the fertility of the earth, especially when leguminous plants are cultivated. It is not probable that this neutral salt acts in the same manner as lime, and we are ignorant of what is its mode of acting.

Soil [*terre végétale*] possesses the property of being able to retain as much as three-fourths of its weight of water without appearing moist, and like charcoal, it condenses atmospheric humidity. It owes this property to the geine which it contains, which is one of the substances which, of all known, absorbs moisture with most energy. Mould [*terreau*] can absorb double its weight of water, without appearing moist; and after being dried, it draws from the air, in less than twenty-four hours, a quantity of water, which may vary according to the humidity of the atmosphere, from 80 to 100 per cent. of its weight. This property depends upon its light and dust-like consistence; and geine, of which the fracture becomes vitreous from its course of chemical treatment, is deprived of this physical property, which is of the utmost importance to vegetable life. For, in consequence of this property, mould retains water in the earth and obstructs its evaporation; and it is probably this water which maintains the extremities of the roots in the state to perform their functions.

It is usual to divide soil into fertile earth, and acid earth.* The first is very common—the second presents itself but rarely. It produces nothing, unless it be mosses: it is in marshy places that it is ordinarily found. It is in general composed in the same manner as fertile earth; but whilst in the latter the geine is united with lime, and perhaps with other bases besides, it is, in the acid earth, combined with acids, which, according to Einhof, are the phosphoric and acetic acids. It is for this reason that it has the property of reddening vegetable blues, and that it gives, by calcination, ashes which contain phosphoric acid. To dry distillation, it yields a great quantity of an

acid liquid, containing the acetate of ammonia; and when it is distilled, after having mixed it with water, a liquid product is obtained which reddens vegetable blues, and likewise contains acetate of ammonia. In opposition to Einhof, Sprengel affirms that the acid geine is produced only for the want of bases, and that its acid action proceeds only from the geic acid which it contains, and not from the presence of a foreign acid. De Pontin has made the analysis of an arid* soil taken from the plain of Eckerud in the government of Elfsburg in Sweden, and found that the geine had there combined with the malic, acetic, and phosphoric acids. The dissolving of the soluble principles of the soil in boiling water, left to be deposited, when the hydrate of lime was mixed therein, these acids as well as geine, so that there was found afterwards in the water only traces of the acetate and hydrate of lime. But when a current of carbonic acid gas was made to pass through this precipitate steeped in water, the geine remained, without dissolving, in combination with the carbonate of lime produced, while there was formed a solution slightly yellowish, which left, after evaporation, a residue of calcareous salts. This residue was treated by alcohol, which took up a certain quantity of acetate of lime, and left a salt of lime of a gummy appearance, which was soluble in water, and possessed the properties of the malate of lime. In burning the geate of lime, and taking up the residue by muriatic acid, there was obtained a solution which, when treated by ammonia, gave a small precipitate of phosphate of lime. The greater part of the acid geine was dissolved in the carbonate of ammonia. Hydrate of lime was poured into the solution, which precipitated the geine without leaving in solution a salt of lime. But when after having washed the precipitate, it was calcined, and the residue treated with muriatic acid, there was obtained a solution, which, after the expulsion of the carbonic acid, gave with ammonia an abundant precipitate of the phosphate of lime. These experiments confirm those given by Einhof.

An arid* soil becomes fertile when there is mixed with it lime, or ashes and earth, inasmuch as the soil consists principally of geine. The report of Sprengel, according to which, it [this character of soil] is produced in consequence of the absence of the bases which are found in fertile earth, is certainly true; but it does not follow from that, that it owes its acidity solely to the acid nature of the geine. The ashes of arid* soil always contain a great quantity of silex.

* It is not a little strange to say it is "usual [*dans l'usage*] to divide soils into fertile earth and acid earth," when the acid nature of any, has been treated by Berzelius as a new discovery, and of which the truth is not admitted by all of those who had taken the subject into consideration. If this division had indeed been usual, there would have been no want of numerous authorities (whatever might be their value) for the acidity of soil.

*This is still more strange, that so abrupt a translation should be made from *acid*, to *arid* soils—and in such manner as to induce the belief that the change was not owing to the author—but to an error of the press. But though this mistake would be as likely to occur in French as almost any other, (only one letter being different in the words *acide* and *aride*—) still it is difficult to believe that this same error should have been made and left to stand three times in this and the next page, where "arid" soils are named, and are marked * as above. The French translation is said to contain numerous typographical errors. I leave others to decide whether these are among the number or not.

[NOTE G. Page 35.]

THE STATEMENTS OF BRITISH AUTHORS ON MARL, GENERALLY INCORRECT AND CONTRADICTORY.

Custom compels me to apply improperly the name *marl* to our deposits of fossil shells. But as I have defined the manuring by this substance, which is called *marling*, to be simply *making a soil calcareous*, or more so than it was before, any term used for that operation would serve, if its meaning was always kept in view. But this term, unfortunately, is of old and frequent use in English books, with very different meanings. The existence of these differences and errors, has been generally stated in the foregoing pages of this essay, and I shall here present the proofs. The following quotations will show that the term *marl* is frequently applied in Britain, to clays containing no known or certain proportion of calcareous earth—that when calcareous earth is known to be contained, it is seldom relied on as the most valuable part of the manure—and that in many cases the reader is left in doubt whether the manure has served to increase, or diminish, or has not altered materially, the amount of the former calcareous ingredient of the soil.

The passages quoted will exhibit so fully the striking contradictions and ignorance generally prevailing as to the nature and operation of marl, that it will scarcely be necessary for me to express dissent in every case, or to point out the errors or uncertainty of facts, or of reasoning, which will so abundantly appear.

1. Kirwan, on the authority of Arthur Young, and the *Bath Memoirs*, [1783] states that

"in some parts of England, where husbandry is successfully practised, any loose clay is called *marl*: in others, *marl* is called *chalk*, and in others, *clay* is called *loam*."—*Kirwan on Manures*, p. 4.

2. The learned and practical Miller thus defines and describes marl, in the abridgment of the *Gardener's Dictionary*, fifth London edition, at the article *marl*.

"*Marl* is a kind of clay which is become fatter and of a more enriching quality, by a better fermentation, and by its having lain so deep in the earth as not to have spent or weakened its fertilizing quality by any product. *Marls* are of different qualities in different counties of England."

He then names and describes ten varieties, most of them being very minutely and particularly characterized—and in only two of the ten, is there any allusion to a calcareous ingredient, and in these, it is evidently not deemed to constitute their value as manures. These are "the cowshut marl" of Cheshire, which—

"is of a brownish color, with blue veins in it, and little lumps of chalk or limestone"—and "clay-marl; this resembles clay, and is pretty near akin to it, but is fatter, and sometimes mixed with chalk stones."

"The properties of any sorts of marls, by which the goodness of them may be best known, are better judged of by their purity and uncompoundness, than their color: as if it will break in pieces like dice, or into thin flakes, or is smooth like lead ore, and is without a mixture of gravel or sand; if it will shake like slatestones, and shatter after wet, or will tumble

into dust, when it has been exposed to the sun; or will not hang and stick together when it is thoroughly dry, like tough clay; but is fat and tender, and will open the land it is laid on, and not bind; it may be taken for granted that it will be beneficial to it."

3. *Johnson's Dictionary* (Octavo edition) defines marl in precisely the words of the first sentence of Miller, as quoted above.

4. *Walker's Dictionary* (Octavo edition) gives only the following definition—"marl—a kind of clay much used for manure."

5. *A Practical Treatise on Husbandry*, (2nd London edition 4to, 1762,) which professes to be principally compiled from the writings of Duhamel, Evelyn, Home, and Miller, supplies the following quotations.

"But of all the manures for sandy soils, none is so good as marl. There are many different kinds and colors of it, severally distinguished by many writers; but their virtue is the same; they may be all used upon the same ground, without the smallest difference in their effect. The color is either red, brown, yellow, grey, or mixed. It is to be known by its pure and uncompound nature. There are many marks to distinguish it by; such as its breaking into little square bits; its falling easily into pieces, by the force of a blow, or upon being exposed to the sun and the frost; its feeling fat and oily, and shining when 'tis dry. But the most unerring way to judge of marl, and know it from any other substance, is to break a piece as big as a nutmeg, and when it is quite dry, drop it into a glass of clear water, where, if it be right, it will dissolve and crumble, as it were, to dust, in a little time, shooting up sparkles to the surface of the water."—p. 27.

—Not the slightest hint is here of any calcareous ingredient being necessary, or even serving in any manner to distinguish marl. But afterwards, in another part of this work, when *shell marl* is slightly noticed, it is said,

"this effervesces strongly with all acids, which is perhaps chiefly owing to the shells. There are very good marls which show nothing of this effervescence: and therefore the author of the *New System of Agriculture* judged right in making its solution in water the distinguishing mark."—p. 29.

The last sentence declares, as clearly as any words could do, that, in the opinion of the author no calcareous ingredient is necessary, either to constitute the character, or the value of marl. And though it may be gathered from other parts of this work, that what is called marl generally contains calcareous earth, yet no importance seems attached to that quality, any more than to the particular color of the earth, or any other accidental or immaterial appearance of some of the varieties described.

The "shell marl" alluded to above, without explanation might be supposed to be similar to our beds of fossil shells, which are called marl. The two manures are very different in form, appearance, and value, though agreeing in both being calcareous. The manure called shell marl by the work last quoted from, is described there with sufficient precision, and more fully in several parts of the *Edinburgh Farmer's Magazine*,* and in the *Memoirs of the Philadelphia Agricultural Society*.† It is still more unlike *marl* properly so

* See *Farmers' Register*, Vol. I. p. 90.

† Vol. 3. p. 206.

called, than any of the substances described under that name, in the foregoing quotations. This manure is almost a pure calcareous earth, being formed of the remains of small fresh-water shells deposited on what were once the bottoms of lakes, but which have since become covered with bog or peat soil. If I may judge from our beds of muscle shells, (to which this manure seems to bear most resemblance,) much putrescent animal matter is combined with, and serves to give additional value to these bodies of shells. This kind of manure is sold in Scotland by the bushel, at such prices, as show that it is very highly prized. It seems to be found but in few situations, and though called a kind of marl, is never meant when that term alone is used generally.

The opinions expressed in the foregoing extracts, prove sufficiently that it was not the ignorant cultivators only, who either did not know of, or attached no importance to the calcareous ingredient in marl: and it was impossible, that from any number of such authors, an American reader could learn that either the object, or the effect of *marling*, was to render a soil more calcareous—or that our bodies of fossil shells resembled marl in character, or in operation, as a manure. Of this, the following quotation will furnish striking proof—and the more so, as the author refers frequently to the works of Anderson, and of Young, who treated of marl and calcareous manures, in a more scientific manner than had been usual. This author, Bordley, cannot be justly charged with inattention to the instruction to be gained from books: for his greatest fault, as an agriculturist, is his fondness for applying the practices of the most improved husbandry of England, to our lands and situations, however different and unsuitable—which he carries to an extent that is ridiculous as theory, and would be ruinous to the farmer who should so shape his general practice.

6. "I farmed in a country [the Eastern Shore of Maryland] where habits are against a due attention to manures: but having read of the application of marl as a manure, I inquired where there was any in the peninsula of the Chesapeake, in vain. My own farm had a grayish clay, which to the eye was marl: but because it did not effervesce with acids, it was given up, when it ought to have been tried on the land, especially as it rapidly crumbled and fell to mud, in water, with some appearance of effervescence."—*Bordley's Husbandry*, 2nd ed. p. 55.

That peninsula, through which Mr. Bordley in vain inquired for marl, has immense quantities of the fossil shells which we so improperly call by that name. But as his search was directed to *marl* as described by English authors—and not to calcareous earth simply—it is not to be wondered at that he should neither find the former substance, nor attach enough importance to the latter, to induce the slightest remark on its probable use as manure.

7. The *Practical Treatise on Husbandry*, among the directions for improving clay land, has what follows.

"Sea sand and sea shells are used to great advantage as a manure, chiefly for cold strong (i. e. clay) land, and loam inclining to clay. They separate the parts; and the salts which are contained in them are a very great improvement to the land. Coral, and such kind of stony plants which grow on the rocks, are filled with salts, which are very beneficial to land. But as

these bodies are hard, the improvement is not the first or second year after they are laid on the ground, because they require time to pulverize them, before their salts can mix with the earth to impregnate it. The consequence of this is, that their manure is lasting. Sand, and the smaller kind of sea weeds, will enrich land for six or seven years: and shells, coral, and other hard bodies, will continue many years longer.

"In some countries fossil shells have been used with success as manure; but they are not near so full of salts, as those shells which are taken from the sea shore; and therefore the latter are always to be preferred. Sea sand is much used as manure in Cornwall. The best is that which is intimately mixed with coral."—p. 21.

After stating the manner in which this "excellent manure" is taken up from the bottom, in burges, its character is thus continued:

"it [i. e. the sea sand mixed with coral, as it may happen,] gives the heat of lime, and the fatness of oil, to the land it is laid upon. Being more solid than shells, it conveys a greater quantity of fermenting earth in equal space. Besides, it does not dissolve in the ground so soon as shells, but decaying more gradually, continues longer to impart its warmth to the juices of the earth."

Here are described manures which are known to be calcareous, which are strongly recommended—but solely for their supposed mechanical effect in separating the parts of close clays, and on account of the salts derived from sea water, which they contain. Indeed, no allusion is made to any supposed value, or even to the presence of calcareous earth, which forms so large a proportion of these manures: and the fossil shells, (in which that ingredient is more abundant, more finely reduced, and consequently more fit for both immediate and durable effects,) are considered as less efficacious than solid sea shells—and inferior to sea sand. All these substances, besides whatever service their salts may render, are precisely the same kind of calcareous manure, as our beds of fossil shells furnish in a different form. Yet neither here nor elsewhere, does the author intimate that these manures and marl have similar powers for improving soils.

The foregoing quotations show what opinions have been expressed by English writers of reputation—and what opinion would be formed by a general reader of these and other agricultural works, of the nature of what is called marl, in England, as well as what is so named in this part of our country. I do not mean that other authors have not thought more correctly, and sometimes expressed themselves with precision on this subject. Mineralogists define *marl*, to be a *calcareous clay**—and in this correct sense, the term is used by Davy, and other chemical agriculturists. Such authors as Young, and Sinclair, also could not have been ignorant of the true composition of marl—yet even they have used so little precision or clearness, when speaking of the effects of *marling*, that their statements, (however correct they may be in the sense they intended them,) convey no exact information, and have not served to remove the erroneous impressions made by the great body of their predecessors. Knowing as Young did [see first quotation] the confusion in

* Cleaveland's Mineralogy.

which this subject was involved, it was the more incumbent on him to be guarded in his use of terms so generally misapplied. Yet considering his practical and scientific knowledge as an agriculturist, his extensive personal observations, and the quantity of matter he has published on soils and calcareous manures, his omissions are more remarkable than those of any other writer. In such of his works as I have met with, though full of strong recommendations of marling, in no case does he state the composition of the soil, (as respects its calcareous ingredient,) or the proportion added by the operation—and generally notices neither, as if he viewed marling just as most others have done. These charges are supported by the following extracts and references.

8. Young's *Farmer's Calendar*, 10th London edition, page 40.—On marling. Through nearly four pages this practice is strongly recommended—but the manures spoken of, are regularly called "marl or clay," and their application, "marling or claying." Mr. Rodwell's account of his practice is inserted at length. On leased land he "clayed or marled" eight hundred and twenty acres with one hundred and forty thousand loads, and at a cost of four thousand nine hundred and fifty-eight pounds—and the business is stated to have been attended with great profit. At last, the author lets us know that it is not the same substance that he has been calling "marl or clay"—and that the marl effervesces strongly with acids, and the clay slightly. But we are told nothing more precise as to the amount of calcareous ingredients, either in the manures, or the soil—and even if we were informed on those heads, (without which we can know little or nothing of what the operation really is,) we are left ignorant of how much was clayed, and how much marled. It is to be inferred, however, that the clay was thought most serviceable, as Mr. Rodwell says—

"clay is much to be preferred to marl on those sandy soils, some of which are loose, poor, and even a black sand."

9. Young's *Survey of Norfolk*, (a large and closely printed octavo volume,) has fourteen pages filled with a minute description of the soils of that county—but without any indication whatever of the proportion, presence, or absence, of calcareous earth in that extensive district of sandy soils, so celebrated for their improvement by marling—nor in any other part of the county. The wastes are very extensive: one of them (page 385) eighteen miles across, quite a desert of sand, "yet highly improveable." Of this also, no information is given as to its calcareous constitution.

10. The section on marl (page 402, of the same work) gives concise statements of its application, with general notices of its effects, on near fifty different parishes, neighborhoods, or separate farms. Among all these, the only statements from which the calcareous nature of the manure may be gathered, are, (page 406) of a marl that "ferments strongly with acids"—another, (page 409,) that marling at a particular place destroys scorch—and (page 410) that the marl is generally calcareous, and that that containing the most clay, and the least calcareous earth, is preferred by most persons, but not by all.

Young's *General View of the Agriculture of Suffolk*, (an octavo of 432 pages of close print,)

in the description of soils, affords no information as to any of them being calcareous, or otherwise: yet the author mentions (page 3) having analyzed some of the soils, and reports their aluminous and silicious ingredients. Nor can more be learned, in this respect, in the long account afterwards given of the "marl" which has been very extensively applied also in the county of Suffolk. We may gather however from the following extracts, that the "marl or clay" of Suffolk, is generally calcareous, but that this quality is not considered the principal cause of its value—and further, that *crag*, a much richer calcareous manure, (which seems to be the same with our richest beds of fossil shells, or marl,) is held to be injurious to the sandy soils, which are so generally improved by what is there called marl.

11. "Claying—a term in Suffolk, which includes marling; and indeed the earth carried under this term is very generally a clay marl; though a pure, or nearly a pure clay, is preferred for very loose sands."—*Young's Suffolk*, p. 186.

12. After speaking of the great value of this manure on light lands, he adds—

"but when the clay is not of a good sort, that is, when there is really none, or scarcely any clay in it, but is an imperfect and even a hard chalk, there are great doubts how far it answers, and in some cases has been spread to little profit."—p. 187.

13. "Part of the under stratum of the county is a singular body of cockle and other shells, found in great masses in various parts of the country, from Dunwich quite to the river Orwell, &c."—"I have seen pits of it to the depth of fifteen or twenty feet, from which great quantities had been taken for the purpose of improving the heaths. It is both red and white, and the shells so broken as to resemble sand. On lands long in tillage, the use is discontinued, as it is found to make the sands blow more." [That is, to be moved by the winds.]—p. 5.

13. The *Essay on Manures* by Arthur Young, for which the author was honored with the Bedlford medal, speaks distinctly enough of the value of marl being due to its calcareous ingredient, (as this author doubtless always knew, notwithstanding the looseness of most of his remarks on this head—) but at the same time he furnishes some of the strongest examples of absurd inferences, or of gross ignorance of the mode in which calcareous earth acts as an ingredient of soil, and the proportion which soils ought to contain. These are his statements, and his reasoning thereon:

"It is extremely difficult to discover, from the knowledge at present possessed by the public, what ought to be the quantity of calcareous earth in a soil. The best specimen analyzed by Giobert, had 6 per cent.; by Bergman, 30 per cent.; by Dr. Fordyce, 2 per cent.; a rich soil, quoted by Mr. Davy, in his lecture at the Royal Institution, 11 per cent. This is an inquiry, concerning which I have made many experiments, and on soils of the most extraordinary fertility. In one, the proportion was equal to 9 per cent.; in another, 20 per cent.; another, 3 per cent.; and in a specimen of famous land, which I procured from Flanders, 17 per cent. But the circumstance which much perplexes the inquiry is, that many poor soils possess the same or nearly the same proportions, as these most fertile ones. To attain the truth in so important a point, induced me to repeat many trials, and to compare every circumstance; and I am disposed to conclude, that the necessity of there being a large proportion of calcareous earth in a soil, depends on the deficiency of organic

[i. e. vegetable or animal] matter; of that organic matter which is [partly] convertible into hydrogen gas. If the farmer finds, by experiment, that his soil has but a small quantity of organic matter, or knows by his practice that it is poor, and not worth more than 10s., 15s. or 20s. an acre, he may then conclude that there ought to be 20 per cent. of calcareous earth in it; but if, on the contrary, it abound with organic matter, and be worth in practice a much larger rent, in that case his marl cart will not be called for, though there be but five per cent. or even less, of calcareous matter."—*Young's Essay on Manures*—Sect. 2.

It is scarcely necessary to show, that the opinion of calcareous matter, being needed in larger quantities in proportion to the deficiency of putrescent matter, is directly opposed to the reasoning of this essay. If a poor soil were made to contain twenty per cent. of calcareous matter, by applying lime, chalk, or marl, the quantity and the expense would be so enormous as not to be justified by any possible return—and in truth, would lessen, rather than increase, the product of a poor soil. The fact named as strange, by Young, that some rich soils contain very small, and others very large proportions of calcareous earth, is easily explained. If a natural soil contains any excess of calcareous earth, even though but one per cent., it shows that there is that much to spare after serving every purpose of neutralizing acids and combining with putrescent matter. If there were twenty per cent. more of calcareous matter, it would be useless, until met by an additional supply of putrescent matter. Young's statement that some poor soils agree precisely with other rich soils, in their contents of calcareous earth, does not necessarily contradict my doctrine that a proper proportion of calcareous earth will enable any soil to become rich, either in a state of nature, or under mild cultivation—and for the following reasons:

14. 1st. The correctness of Young's analyses may be well doubted—and if he used the then usual process for separating calcareous earth, he was obliged to be incorrect, on account of its unavoidable imperfection, as has been already explained at page 18. 2d. It cannot be known positively what was the original, state of fertility of most cultivated soils in England, nor whether they were subjected to exhausting or improving cultivation, for centuries before our information from history begins. 3d. Lime has been there used for a long time, and to great extent; and chalk and marl were applied as manures during the time of the Roman conquest, as stated by Pliny, (say 1700 years ago)—so that it cannot be always known whether a soil has received its calcareous ingredient from nature, or the industry of man. 4th. It is known that severe cropping after liming, and also excessive doses of calcareous earth, have rendered land almost barren: of which the following extracts offer sufficient proof:—

"Before 1778, [in East Lothian] the outfield did not receive any dung except what was left by the animals grazed upon it. In many cases, outfield land was limed; and often with singular advantage. The after management was uniformly bad; it being customary to crop the limed outfield with barley and oats successively, so long as the crop was worth cutting. In this way numerous fields suffered so severely as to be rendered almost sterile for half a century afterwards." *Farmer's Magazine*, p. 53, Vol. 12.

"An overdose of shell marl, laid perhaps an inch thick, produces for a time large crops. But at last it

renders the soil a *caput mortuum*, capable of neither corn nor grass; of which, there are too many examples in Scotland, &c. *Gentleman Farmer*, p. 378.

15. Yet the last writer (Lord Kames) elsewhere states, (at page 379) that as much clay marl as contains 1500 bolls, (on 9000 bushels) of pure calcareous earth to the acre, is not an overdose in Scotland.

16. "Marl. Of this substance, there are four sorts, rock—slate—clay—and shell marl. The three former are of so heavy a nature that they are seldom conveyed to any distance; though useful when found below a lighter soil. But shell marl is specifically lighter, and consists entirely of calcareous matter, (the broken and partially decayed shells of fish,) which may be applied as a top dressing to wheat and grass, when it would be less advantageous to use quicklime." [This is the kind of manure referred to in extract 5, and there more particularly described.] "In Lancashire and Cheshire, clay, or red marl, is the great source of fertilization, &c."—"The quantity used is enormous; in many cases about three hundred middling cart loads per acre, and the fields are sometimes so thickly covered as to have the appearance of a red soiled fallow, fresh ploughed."—*Sinclair's Code of Agriculture, American Ed. (Hartford) p. 138.*

This account of the Lancashire improvements made by red clay marl, closes with the statement that "the effects are represented to be beneficial in the highest degree"—which is fully as exact an account of profit, or increased production, as we can obtain of any other marling. Throughout, there is no hint as to the calcareous constituents of the soil, or the manure, or whether either rock, clay or slate marls generally, are valuable for that, or for other reasons; nor indeed could we guess that they contained any calcareous earth, but for their being classed, with many other substances, under the general head of calcareous manures.

17. "The means of ameliorating the texture of chalky soils, are either by the application of clayey and sandy loams, pure clay, or marl."—"The chalk stratum sometimes lies upon a thick vein of black tenacious marl, of a rich quality, which ought to be dug up and mixed with the chalk."—*Code of Agriculture*, p. 19.

18. Dickson's *Farmer's Companion*.—"The author recommends "argillaceous marl" for the improvement of chalky soils: and for sandy soils, "where the calcareous principle is in sufficient abundance, argillaceous marl, and clayey loams," are recommended as manures.

19. "Chalky loam. The best manure for this soil is clay, or argillaceous marl, if clay cannot be had; because this soil is defective principally in the argillaceous ingredient."—*Kirwan on Manures*, p. 80.

The evident intention and effect of the marling recommended in all the three last extracts, is to diminish the proportion of calcareous earth in the soil.

20. In a *Traveller's Notes* of an agricultural tour in England, in 1811, which is published in the third volume of the *Edinburgh Farmer's Magazine*, the following passages relate to Mr. Coke's estate, Holkham, and to Norfolk generally.

"Holkham.—The soil here is naturally very poor, being a mixture of sand, chalk, and flint stones, with apparently little mixture of argillaceous earth—in the subsoil, chalk or limestone every where." Page 450.

"As the soil of the territory [of Norfolk generally] through which I passed, seems to have a sufficient mixture of calcareous earth naturally, I learn they do not often lime their lands; but clay marl has been found to have the most beneficial consequences on most of the Norfolk soils."—p. 487.

21. "In Norfolk, they seem to value clay more than marl, probably because their sandy soils already contain calcareous parts."—*Kirwan on Manures*, p. 87.

From this and the preceding quotation it would follow, that the great and celebrated improvements in Norfolk, made by marling, had actually operated to lessen the calcareous proportion of the soil, instead of increasing it. Or, (as may be deduced from what will follow,) if so scientific and diligent an inquirer as Kirwan, was deceived on this very important point, it furnishes additional proof of the impossibility of drawing correct conclusions on this subject from European books—when it is left doubtful, whether the most extensive, the most profitable, and the most celebrated improvements by "marling," in Europe, have in fact served to make the soil more or less calcareous.

Most of the extracts which I have presented, are from British agriculturists of high character and authority. If such writers as these, while giving long and (in some respects) minute statements of marl, and marling, omit to tell, or leave their readers to doubt, whether the manure or the soil is the most calcareous—or what proportions of calcareous earth, or whether any, is present in either—then have I fully established that the American reader who may attempt to draw instruction from such sources, as to the operation, effects and profits of either marl or calcareous manures, in general will be more apt to be deceived and misled, than enlightened.

I have now to refer to an author, whose works, well known as they may be to others, had not come under my view until after the publication of most of the foregoing extracts. Otherwise, Marshall would have been stated as an exception to the general silence of British authors as to the true and precise nature of what they treated of as marl. But though he has not been, like others, so faulty as to leave in doubt what was the character and value of the marls, of which he spoke, and the nature of their operation on the soils to which they were applied—still no other writer furnishes stronger proof of the general ignorance and disregard of the nature of marls and calcareous manures, and of their mode of operation; and even the author himself is not free from the same charge, as will be shown. I shall quote more at length from Marshall, because he presents the strongest opposition to what I have stated as to the general purport of publications on marling: and also, because, whatever may be their character, there is much to interest the reader in his accounts of the opinions and practices of those who have used calcareous manures longest, and most extensively, although without knowing what they were doing.

In his *Rural Economy of Norfolk*, the "marls" and "clays" most used in the celebrated improvements of that county are minutely described, and the chemical composition stated—showing that both are highly calcareous. Of the "marls," or chalks, most used for manure in Norfolk, he analyzed three specimens, and one of clay, and found the proportions of pure calcareous matter as follows:

Chalk marl of Thorp-market, contained,	88
Soft chalk of Thorp-next-Norwich,	100
Hard chalk of Swaffham, almost pure—	100
Clay marl of Hemsby,	43
	100

22. Of these he spoke previously and in general terms, thus:

"The central and northern parts of the district abound, universally, with a whitish-colored chalk marl; while the Fleg Hundreds, and the eastern coast, are equally fortunate in a gray-colored clay marl.

"The first has, in all probability, been in use as a manure many centuries: there are oaks of considerable size now going to decay in pits which have obviously been heretofore in use, and which, perhaps, still remain in use, as maripits.

"The use of clay marl, as a manure, seems to be a much later discovery; even yet, there are farmers who are blind to its good effect; because it is not marl, but "clay;" by which name it is universally known.

"The name, however, would be a thing of no import, were it not indiscriminately applied to unctuous earths in general whether they contain, or not, any portion of calcareous matter. Nothing is "marl" which is not white; for, notwithstanding the county has been so long and so largely indebted to its fertilizing quality, her husbandmen, even in this enlightened age, remain totally ignorant of its distinguishing properties: through which want of information much labor and expense is frequently thrown away.

"One man seeing the good effect of the Fleg clay, for instance, concludes that all clays are fertile, and finding a bed of strong brick earth upon his farm, falls to work, at a great expense, to "claying;"—while another observing this man's miscarriage, concludes that all clays are unprofitable; and, in consequence, is at an expense, equally ill applied, of fetching "marl" from a great distance; while he has, perhaps, in his own farm, if judiciously sought after, an earth of a quality equally fertilizing with that he is throwing away his time and his money in fetching. *Marshall's Norfolk Vol. I. p. 16.*

Yet it is remarkable, that Marshall should not have intimated whether the Norfolk soils were naturally calcareous, (as the two writers just before quoted declare,) or not—and therefore we are still left to guess whether these manures served to increase the calcareous quality of soils already possessing that quality in a high degree—or to give it to soils devoid of it before.

Other passages will now be quoted from the same, and from other similar works of Marshall's, to show the prevailing ignorance of the ingredients, and operation of the marls sometimes prized, and sometimes contemned, with as little reason in the one case as the other, by farmers in various parts of England.

23. "The principal part of his estate, however, is of a much shallower soil, not deeper than the plough goes; and its present very amazing fertility he ascribes in a great measure, to his having clayed it. Indeed to this species of improvement the fertility of the Fleg Hundred is allowed to be principally owing.

"Mr. F. gave me an opportunity of examining his clay pit, which is very commodious; the uncallow is trifling, and the depth of the bed or jam he has not been able to ascertain. It is worked, at present, about ten or twelve feet deep.

"The color of the fossil, when moist, is dark brown, interspersed with specks of white; and dries to a color lighter than that of fuller's earth; on being exposed to the air, it breaks into small die-like pieces.

"From Mr. F's account of the manner of its acting, and more particularly from its appearance, I judged it

to be a brown marl, rather than a clay; and, on trying it in acid, it proves to be strongly calcareous; effervescing, and hissing, more violently than most of the white marls of this neighborhood: and what is still more interesting, the Hemsby clay is equally turbulent in acid as the Norwich marl, which is brought by water forty miles into this country, at the excessive expense of four shillings a load upon the staith; besides the land carriage. [The strength of this Hemsby clay is stated above.]

"It is somewhat extraordinary that Mr. F., sensible and intelligent as he is, should be entirely unacquainted with this quality of his clay; a circumstance, however, the less to be wondered at, as the Norfolk farmers, in general, are equally uninformed of the nature and properties of marl." *Marshall's Norfolk, Vol. II, page 192.*

The following is a remarkable instance, in a particular district, of a clay, very poor in calcareous matter, being considered and used as valuable manure, and a very rich marl equally accessible, being deemed inferior.

24. "The marl is either an adulterate chalk, found near the foot of the chalky steeps of the West Downs, lying between the chalk rock and the Maam soil, partaking of them both—in truth, a marl of the first quality; or a sort of blue mud, or clay, dug out of the area of this district, particularly, I believe, on the south side of the river. This is said to have been set on, with good effect; while the former is spoken of, as of less value; whereas, the white is more than three-fourths of it calcareous; while the blue does not contain ten grains, per cent., of calcareous matter." *Marshall's Southern Counties, Vol. p. 176.*

The greater part of what are called marls in the following extract, and used as manure, contain so little calcareous earth, that whatever power they may exert, must be owing to some other ingredient. Yet without Marshall's analysis, they would be considered to deserve the character of calcareous manures, as much as any others before named.

25. "The red earth which has been set upon the lands of this district, in great abundance, as 'marl,'—is much of it in a manner destitute of calcareous matter; and, of course, cannot, with propriety, be classed among marls.

"Nevertheless, a red fossil is found, in some parts of the district, which contains a proportion of calcareous matter.

"The marl of Croxall (in part, of a stonelike, or slaty texture, and of a light red color) is the richest in calcareosity: one hundred grains of it afford thirty grains of calcareous matter; and seventy grains of fine, impalpable, red-bark-like powder."

"And a marl of Elford (in color and texture various, but resembling those of the Croxall marl) affords near twenty grains:

"Yet the marl of Barton, on the opposite side of the Trent—though somewhat of a similar texture, but of a darker more dusky color—is in a manner destitute of calcareosity! one hundred grains of it yielding little more than one grain—not two grains of calcareous matter. Nevertheless, the pit, from which I took the

specimens analyzed, is an immense excavation, out of which many thousand loads have been taken.

"And the marls of this neighborhood (which mostly differ in appearance from those described, having generally that of a blood-red clay, interlayered, and sometimes intermingled, with a white gritty substance) are equally poor in calcareosity.

One hundred grains of the marl of Statfold (which I believe may be taken as a fair specimen of the red clays of this quarter of the district) afford little more than two grains of calcareous matter.* Yet this is said to be "famous marl;" and, from the pits which now appear, has been laid on in great abundance.

"I do not mean to intimate, that these clays are altogether destitute of fertilizing properties, on their first application. It is not likely that the large pits which abound, in almost every part of the district, and which must have been formed at a very great expense, should have been dug, without their contents being productive of some evidently, or at least apparently, good effect, on the lands, on which they have been spread.

I confess, however, that this is but conjecture; and it may be, that the good effect of the marls, first described being experienced, the fashion was set; and, the distinguishing quality being unknown, or not attended to, marls and clays were indiscriminately used." *Marshall's Midland Counties, Vol. I. p. 152.*

26. "On the southern banks of the Anker, is found a grey marl; resembling, in general appearance, the marl of Norfolk, or rather the fuller's earth of Surry. In texture, it is loose and friable.

"This earth is singularly prodigal of its calcareosity. The acid being dropped on its surface, it flies into bubbles as the Norfolk marl. This circumstance, added to that of a striking improvement, which I was shown as being effected by this earth, led me to imagine, that it was of a quality similar to the marls of Norfolk.

"But, from the results of two experiments—one of them made with granules formed by the weather, and collected on the site of improvement, the other with a specimen taken from the pit it appears that one hundred grains of this earth contain no more than six grains of calcareous matter! the residuum a cream colored saponaceous clay, with a small proportion of coarse sand." *Marshall's Midland Counties, Vol. I. p. 155.*

The last extracts suggest a remark which ought to have been made earlier. When there is so much general ignorance prevailing among practical farmers as to what they call marl, it cannot be expected that the most intelligent writers can be correct, when attempting to record their practices. When Arthur Young, for example, reports the effects of marl in fifty different localities, as known from the practice of perhaps more than several hundred individuals, it must be inferred that he uses the term generally, as they did from whom his information was gathered—and in very few cases, if at all, as learned by his own analyses. Therefore, it may well be doubted whether the uncertainty as to the character of marl does not extend very generally to even the most scientific writers on agriculture.

As the foregoing exhibits the use of "marls" destitute of calcareous earth, so the following shows under the name of sea sand, a manure which is in its chemical qualities a rich marl (in our sense) or calcareous manure.

27. "Sea-sand. This has been a manure of the district, beyond memory, or tradition.

"There are two species still in use: the one bearing the ordinary appearances of sea sand, as found at the

* This marl is singularly tenacious of its calcareous matter; dissolving remarkably slowly. One hundred grains, roughly pounded, was twenty-four hours in dissolving; and another hundred, though pulverized to mere dust, continued to effervesce twelve hours; notwithstanding it was first saturated with water, and afterward shook repeatedly. The Breendon stone, roughly pounded, dissolved in half the time; notwithstanding its extreme hardness.

* Lodged not in the substance of the clay; but in its natural cracks or fissures.

mouths of rivers; namely a compound of the common sand and mud: the other appears, to the eye, clean fragments of broken shells, without mixture; resembling, in color and particles, clean-dressed bran of wheat.

"By analysis, one hundred grains of the former contain about thirty grains of common silicious sea sand, with a few grains of fine silt or mud; the rest is calcareous earth, mixed with the animal matter of marine shells.

"One hundred grains of the latter contain eighty-five grains of the matter of shells, and fifteen grains of an earthy substance, which resembles, in color and particles, minute fragments of burnt clay, or common red brick.

"These sands are raised in different parts of Plymouth Sound, or in the harbor; and are carried up the estuaries, in barges; and from these, on horseback, perhaps five or six miles, into the country; of course at a very great expense: yet without discrimination, by men in general, as to their specific qualities. The shelly kind, no doubt, brought them into repute, and induced landlords to bind their tenants to the use of them; but without specifying the sort—and the bargemen, of course, bring such as they can raise, and convey, at the least labor and expense. It is probable that the specimen first mentioned, is above par, as to quality: I have seen sand of a much cleaner appearance, travelling towards the fields of this quarter of the country; and, near Bedford; in North Devonshire, I collected a specimen, under the operation of "melling" with mould, which contains eighty grains per cent. of clean silicious sand!"

—*Marshall's West of England, Vol. I. page 154.*

It might be inferred from all these proofs of Marshall's knowledge of calcareous earth constituting the real value of marls, that he could scarcely miss the evident corollary to that proposition, that the valuable operation of calcareous manures is to render soils more calcareous—and that the knowledge of the nature of the manure and the soil, would sufficiently indicate when the application of the one to the other was judicious or not. But the following expression of opinion (*Marshall's Yorkshire, Vol. I. p. 377*) is not only strongly opposed to those deductions, but to the general purport of all his truths which I have before quoted.

28. "Nothing at present but comparative experiments can determine the value of a given lime, to a given soil; and no man can, with common prudence, lime any land, upon a large scale, until a moral certainty of improvement has been established by experience."

If this be true, then indeed is there no true or known theory, or established precepts, for applying either lime, or any calcareous manure. It amounts to saying, that every new application is a mere experiment, the result of which cannot even be conjectured from any facts previously known of other soils and other manures.

29. The next quotation, which is from an editorial article in the *Farmer's Journal* of July 28, 1823, shows that the old opinion still prevails, that marl is profitable only on sandy lands; which opinion carries with it the inference that it is the argillaceous quality, rather than the calcareous, that operates. The editor is remarking on a new agricultural compilation by a Mr. Elkinson, and ridiculing the author for his solemn annunciation of the truism (in the editor's opinion,) that, "marling on sand is more useful than on clay land." The reputation of Mr. Elkinson, says the editors,

"may remain undisturbed among the farmers of Lincolnshire for a long time, who may never have chanced

to meet with the old proverb, or have taken a journey into the sandy district of Norfolk. We really do not know whether it be as old Jervais Markham, or not; but we have seen the following lines in black letter:

He that marls sand, may buy land;
He that marls moss, shall have loss;
He that marls clay, throws all away!"

The editor then passes to a subject on which his admitted ignorance serves to prove that the improvement gained by marling could not be simply the making a soil calcareous—for upon that ground, when marl has once been plentifully given, and the land afterwards worked poor, there can be neither reason nor profit, in a second marling. Yet, as if the mode of operation was altogether unknown, this passage follows.

"It was once asked of the editor by a very good practical Norfolk farmer, 'whether land which had been once marled and worn out, would receive the same benefit from a second marling?' It was answered, that an experiment made on one field, or on one acre, would decide the point, but *conjecture led to nothing conclusive*. It has often been observed that loose land, after having been marled and out cropped, deposited its marl in the subsoil, which therefore became more retentive [of water;] and it has been suggested, that deep ploughing ought to be tried, to bring this marl again to the top. We hope that the point here in question, has before now been settled by practice in both ways; though at the above period, (about 1806) such facts had not reached the gentleman alluded to, although a very intelligent man."

The singular fact stated above, of marl, and also of lime, sinking and forming a layer below the soil, is stated by other British writers. No such result has been found in this country, so far as I am informed. Nor do I believe that it can occur, except when the calcareous matter is too abundant to form a chemical combination with the soil, or with the matters in the soil. According to my views of the manner in which calcareous earth acts, it must form such combinations in the soil, to be useful—and if so combined, it cannot be separated, and sink through the soil by the force of gravity, or any other cause.

30. The next article is probably one of the latest publications on marl, yet contains as little of truth, and for its length, as much that is false and absurd, as if it had been written a century ago. It appears in the last number of the *Quarterly Journal of Agriculture*, (for Dec. 1834) and is there quoted from the *Magazine of Gardening and Botany*, and as written by Count Gyllenborg. As no contradictory remarks are appended by either of the editors of these highly respectable journals, it may be considered as in some measure giving countenance to the opinions here presented.

Though the writer speaks of "acid in the land," yet the succeeding part of the sentence which speaks of "imbibing it from stagnating water" shows that no correct or definite idea was attached to the term "acid." The entire piece is copied.

"How far marl contributes to the fertility of soils. 1st, Not materially, for it is devoid of every unctuous and saline matter. 2d, But instrumentally, it promotes vegetation, by attracting the moisture, acids or oils in the atmosphere, which enrich the land. As this quality becomes stronger by burning, how wisely would the farmers act in using it after being calcined. It promotes vegetation, by destroying the acid actually in the land, or removing that which it might be in danger of

imbibing from stagnating water, and hence, also, it may perhaps help to prevent a too acid disposition in the seeds. By dissolving every unctuous substance in the land, whence arises a saponaceous mixture soluble in water, and fitted to enter into the pores of vegetables. By destroying the toughness of strong soils, for, by its quickly crumbling in the air, the cohesion of a clayey soil is diminished, it is rendered easier to cultivate, and more fit to carry on growth of plants. It gives greater solidity and firmness to loose or sandy soils; and, as before observed, it contributes to their fertility, by attracting into this dry soil the nutritive contents of the air. There are some who think that marl should not be laid on sandy soils; but experience has taught us to conclude otherwise, having observed that the most beneficial effects are produced from it on very light and sandy soils. Marl may hurt land by too long and a too plentiful use of it; for, from its calcareous quality, it much resembles lime. It soon dissolves and consumes the fat of the land—and it loosens a clayey soil, so that it becomes less retentive of moisture. Marl is, however, very different, according to its being more or less calcareous or clayey; and therefore, judgement is more or less necessary to adapt it to the nature of the soil. Some have recommended it chiefly for wet and cold soils, and many farmers have observed that it is most useful when mixed with rich manures. Neither of these observations, however, seems to be correct; but a due care should be taken that this manure be adapted to the soil on which it is laid."

[NOTE G 2. Page 36.]

THE EARLIEST KNOWN SUCCESSFUL APPLICATIONS OF FOSSIL SHELLS AS MANURE.

The two old experiments described at page 36, though the only applications of fossil shells known to me, previous to the commencement of my use of this manure, were not all which had been made, and which being deemed failures, had been abandoned and forgotten. Another, within a few miles of my residence, was brought to light and notice afterwards, by an old negro, who was perhaps the only person then living, who had any knowledge of the facts. After I had found enough success in using this manure to attract to it some attention, Mr. Thomas Cocke of Aberdeen was one of those who began, but still with doubt and hesitation, to use marl to some considerable extent. One of his early applications was to the garden. The old gardener opposed this, and told his master that he knew "the stuff was good for nothing, because when he was a boy, his old master (Mr. Cocke's father) had used some at Bonaccord, and it had never done the least good." Being asked whether he could show the spot where this trial had been made, he answered that he could easily, as he drove the cart which carried out the marl. The place was immediately sought. It was on the most elevated part of a very poor field, which had been cleared and exhausted fully a century before. The marled space (a square of about half an acre) though still poor, was at least twice as productive as the surrounding land, though a slight manuring from the farm-yard had been applied a few years before to the surrounding land, and omitted on this spot, which was supposed to have been, from its appearance, the site of some former dwelling house, of which every evidence had disappeared except the permanent improvement of the soil usual from that course.

A close examination showed some fragments of the hardest shells, so as to prove that the old man had not mistaken the spot. This, like other early applications, had been made on a spot too poor for marl to show but very small early effects—and as only one kind of operation of any manure was then thought of, (that which dung produces,) it is not strange that both the master and servant should have agreed in the opinion that the application was useless, and have remained under that opinion until almost all remembrance of the experiment had been lost.

There were also successful and continued uses of this manure in James City County, in Virginia, made earlier than mine; and still earlier by the Rev. John Singleton, in Talbot County, Maryland. It appears that the early (though chance directed) combination of putrescent manures with marl in both these places, served to prove the value of the latter, and perhaps to prevent it being there also abandoned as worthless, as in other cases. But though the application was continued, and with great success and profit, the knowledge of these facts, and the example, extended very slowly: and the then want of communication among farmers, for years kept all ignorant of these practices, except in the immediate vicinity of the commencement of each. I have since endeavored to ascertain the time of the first applications in James City, and have been informed that it was in 1816. Mr. Singleton's, in Maryland, were begun as early as 1805. His own account of his practice (which will be annexed entire, as an interesting statement of the earliest profitable use of this manure,) was first published in 1818, in the 4th volume of the *Memoirs of the Philadelphia Agricultural Society*, (page 238.) The date of his letter is Dec. 31, 1817. My first experiment was made the following month (Jan. 1818,) but more than a year before I met with Mr. Singleton's publication, or had heard of any application of fossil shells, except the two failures mentioned in page 36. But however beneficial may have been found the operation of marl in Talbot and in James City, it is evident, from Mr. Singleton's letter, and from all other sources of information, that the mode of operation remained altogether unsuspected by those who used it: and this was perhaps the principal cause why the practice was so slow in spreading. It is now thirty years since the first proofs were exhibited on the land of Mr. Singleton: yet, according to the report of the geological survey of the lower part of Maryland, (submitted to the legislature of Maryland at its recent session of 1834-5,) it appears, that though the value of marl is well understood, and much use of it made in Talbot county, and part of Queen Anne's, it also appears that almost no use has been made of it on the other and much more extensive parts of the Eastern Shore of Maryland—and none whatever west of the Chesapeake in that state, where it is found in abundance. Such at least are the inferences from Mr. Ducatel's report, though in part drawn from indirect testimony, more than direct and particular assertions.

The slight, and almost contemptuous manner in which marl is mentioned by so well informed an agriculturist as Taylor, as late as 1814, when his *Arator* was published, (and which remains unaltered in his 2d edition of 1817,) proves that al-

most nothing was then known of the value of this manure. All that seems to relate to our fossil shells is contained in the two following passages:

"Without new accessions of vegetable matter, successive heavy dressings with lime, gypsum, and even marl, have been frequently found to terminate in impoverishment. Hence it is inferred, that minerals operate as an excitement only to the manure furnished by the atmosphere. From this fact results the impossibility of renovating an exhausted soil, by resorting to fossils, which will expel the poor remnant of life; and indeed it is hardly probable that divine wisdom has lodged in the bowels of the earth, the manure necessary for its surface."—*Arator* p. 52, 2nd Ed. Baltimore.

"Of lime and marl we have an abundance, but experience does not entitle me to say any thing of either."—p. 80.

From the Rev. John Singleton, to the Hon. Wm. Tilghman.

"Your first question is, 'whether what I use be marl, or soil mixed with shells?'

"Whether it be marl or not, I will not pretend to determine, as I have seen no description of marl that answers exactly to it; but Mr. Tench Tilghman informed me, he had seen a description of marl used in Scotland, exactly similar to what I use on the farm on which I reside, and which is the improved land you mention. I have not seen the account myself. However, this, and all mixtures of broken marine shells, of which there is a great variety, are now denominated marl, here. What I consider the best, and which I most use, is composed of small parts of marine shells, chiefly scallop shell, about one-eighth of an inch square, or somewhat longer or smaller, with scarce any sand or soil with it: some of it seems to be petrified, and is dug up in lumps, like stone, from four or five, to forty or fifty pounds in weight, hard to break even with the edge of an axe, and will remain for years, tumbled about with the plough, before it is entirely broken to pieces, and mixed with the soil; indeed you may observe it in some parts of the bank, where the soil has been washed from it, appearing like rock stone; but if broken and pulverized a little, it effervesces very much with acids. It lies from three to five and six feet deep, from the surface of a light or sandy soil, on the banks of the cove; but how deep the marl, or bed of shells goes, we cannot ascertain, having never dug through it. When we get from two to four feet deep into it, the water springs, so that we have never gone deeper, but fill up the hole with the surface soil, and open another. It does not lie level, but waving, sometimes dipping so deep that we lose it; nor is it of one color, but some white, like dry mortar, some the color of yellow ochre, some red, like red ochre, and some blueish: but I do not know any difference in the quality, from the color. In digging, it is generally loose and crumbly, but mixed with hard lumps as above described: we find sometimes whole shells of scallop, oyster, and barnacles. The kind I estimate most, is of the foregoing description, and I am of opinion it lies at different depths, under the whole of this peninsula, which has been gained from the water, and that the shells are of the different kinds of fish which inhabited the waters while they covered the land. In some places, at heads of coves, I have traced the shells by cutting a ditch from three to five feet deep, down the valley, and even through the marsh, till I came to tide water; but in this kind of low ground there were more whole, and large shells, and none of the large stone-like lumps above mentioned. It appears as if it had been the bottom of the creek, and as if covered by the water more lately than the first described. All these are on this farm. At my other farm, where my uncle formerly lived, and which is at the head of this creek, I find it by digging deep into the ditches, in the meadow ground, which empty into the head of the creek: but that kind differs from what

I have here; as, besides the scallop shells, which are not so much reduced as here, there is, for perches together, the clam shell, perfectly whole, but so soft, that when thrown out of the ditch and exposed to the air, they soon fall away to powder: but the scallop shell seems most abundant; and of this kind of shell-fish we have no knowledge. The beds of shell are to be discovered in many places, on the edges of the creek, and even out into the water; and are found throughout the county, in most places where carefully sought for, but generally, I believe, a good deal mixed with sand. However, I have no doubt they may all be usefully applied as improvers of the soil: they are now coming into the use of many persons in this county, who have discovered them on their land, and have adopted a regular system of manuring.

"Your next question is, 'to what kind of soils, and how it is applied; as a top dressing or ploughed in?'

"I have applied it to all the soils on my farm, some of which is a cold white clay, and wet; others a light loam, and sandy, I find it useful to each kind, and manure my land all over with it, without distinction, and to advantage; putting a smaller quantity upon the looser soils. I have applied it as a top dressing on clover, and also where clover has not been sown, with a view to improving the grass, and also to be satisfied whether it would not be best for the ground, to let it lie spread on the surface, for a year before the ground was put into cultivation. But it has not answered my expectation. I could not perceive any advantage from that mode of application. I now constantly apply it to the ground cultivated in corn; carting it out in the winter and spring, and putting on from twenty to forty cart loads per acre, according to the ground, and the previous quantity that had been put on, in former cultivations, dividing each load into from four to eight small heaps, for the greater ease in spreading, according to the size of the load. Some is put on before, and some after the ground is broken up, but it is all worked into the soil by the cultivation of the corn, and it never fails of considerably improving the crop of corn, as also the ground wherever the marl is, especially in largest quantity. There is a small green moss, and black moist appearance, on the surface of the ground, when not cultivated; as you perceive about old walls, and in strong ground. Though the preceding is the common mode in which I use the marl, I do not think it the best; I mix some in my farm yard, with the farm yard and stable manure; and would prefer mixing and applying all that I use thus mixed, but for the labor of double cartage, which I cannot as yet accomplish, manuring so largely as I do. I cultivate one hundred acres yearly, and constantly manure the whole of what I cultivate; employing only four carts, and four hands with the carts, which do all the manuring and carting on the farm.

"Your next question is, 'what has been my rotation of crops, and mode of cultivating, since I have used this manure?'

"Since I began to use the marl, and bend my attention to improvement by manure, I have cultivated only corn and wheat, sowing my ground in clover, and using the plaster. Instead of cultivating all my ground in corn, and sowing wheat on it as heretofore, I divided my cultivation into two parts, of fifty acres each, putting one part into corn, which I was able to accomplish manuring time enough for the corn, and making a fallow of the other part, manuring as much of it as I could accomplish before the time for sowing wheat; and disregarding, in a degree, all smaller crops, which I could not attend to, as an object, without increasing my number of hands, and interfering with the main business. I went on in this manner, till I found I could easily accomplish manuring one hundred acres and upwards, per annum. Having got my ground to that state that I can risk making a crop without manure, I am now about discarding fallow, being able to manure my whole hundred acres time enough for cropping in the

spring, by beginning to manure for the next year as soon as the spring manuring is finished. I shall in future have no wheat in fallow, but sow it after corn and other crops, from which I am satisfied I can make more from my ground than by naked fallow, which I always considered unprofitable, though you made more wheat, except for the advantage of having more time to manure. The standing annual force on my farm is eight hands, (men,) with one hired by the month. Of these hands four are employed with the carts; two in ploughing, harrowing, &c. for the cultivation of the crop; and the other two or three, as may be, do the blacksmith's and carpenter's work, as also the fencing and other work necessary on a farm: the six hands employed with the carts and ploughs, are not taken off for other business, except in the time of harvest, and sowing wheat, when they are probably stopped. I do not work much with the plough as formerly, but more with the harrow, which lessens and quickens the labor of cultivation, keeps the ground cleaner, and, I think, in better tilth. Occasionally I hire or employ some women, for hoeing work and spreading manure. I flush my ground in large lands, and harrow and roll as it may require; then, instead of listing, as common, mark it out each way with a plough, very shoal, so as not to disturb the grass ploughed down, and after dropping the corn, cover it with the plough or harrow, and immediately put in the harrow, keeping it going, as the weather will permit, till just before harvest, when we plough the ground, and finish the cultivation with the harrow, except something should occur, making it necessary to plough again after harvest. This I have found the best mode of cultivation for corn. I plant my corn about four feet apart each way, and have from three to five stalks in a hill, or cluster, for I endeavor to keep down the hill, and have the ground as level as possible. In saving my corn crop, I cut it up, without pulling it from the stalk as usual, and cart it in all together, then husk it out, leaving the husk to the stalk: I lay these near my feeding yard, and throw them into it twice a day: this gives us a large quantity of strong healthy food for the cattle, which serves them all winter, and keeps them in good condition without any other food; makes a large quantity of excellent manure, and a fine dry feeding yard. As opportunity can be found, we cart marl, fuller's earth, clay, and any good soil that is convenient, into this yard, which being mixed with the stalks, and straw, or any thing else, penning the cattle on it through the winter and summer, instead of penning on the field, in the common way, we have a large quantity of manure to go out in the fall, and next winter; it is put into the field, in the intermediate rows, between the rows of marl, as far as it will go, and they will get mixed in the cultivation. We also convert the scouring of our ditches, the head-lands of the fields, and all wasteground that we can, into manure, by carting litter from the woods, yard manure, or litter, &c. &c. and mixing with them; so that I can nearly, or quite, now, accomplish making farm-yard and this kind of manure, sufficient to go over my whole hundred acres, annually. For the two last years, I have made more manure than I could accomplish or effect carrying out, though I have manured from ten to twenty acres more than my hundred, each year, with part marl and part farm-yard, but not the whole with both, as I hope to be able to do in future; but it will be necessary to increase my carting force to effect it, and I clearly see, I can raise sufficient manure for the purpose; heretofore I have manured my corn-ground, fifty acres, with marl, and my fallow with part farm-yard manure, and part marl, as mentioned before; so that you will perceive the improvement made on my soil has not been effected by marl alone, but in conjunction with farm-yard manure, clover and plaster, and by making it a point to manure with something all the ground I put into cultivation; so that every time I cultivated a field, that field was improved, and not in any degree impoverished by the cul-

tivation. By this means, and the divine assistance, I have effected that improvement of my farm, which is so very striking to the observation of every person acquainted with it. I can say nothing as to the comparison of crops, before and since my improvement: it has been a progressive thing for many years, and, till I adopted the present plan, I was an experimental farmer, trying every thing I met with in books, or heard of; so that there is scarce any rotation of crops, or mode of cultivation, but what I have tried.

"This I believe, will answer all your questions, except as to the time when I began to use the marl, and how soon I experienced the beneficial effect of it—being your fourth question.

"In August, 1805, in digging down a bank on the side of a cove, for the purpose of making a causeway, I observed a shelly appearance, which it struck me might improve clay soil; I took some of it immediately to the house, and putting it into a glass with vinegar, found it effervesced very much; this determined me to try it as a manure; accordingly, in September, I carted out about eighty cart loads, and put it on a piece of ground, fallow, preparing for wheat, trying it in different proportions, at the rate of from twenty-seven to about a hundred loads per acre, and the ground was sown in wheat. I could not, myself, be satisfied that there was any difference through the winter and spring, although general Lloyd, who was viewing it with me in the spring, thought he could perceive some difference, in favor of the marl; but at harvest time, the wheat, though not more luxuriant in growth, or better head, was considerably thicker on the ground; and after the wheat was taken off, the ground where the marl had been put was set with white clover, no clover being on the ground on either side of it. The next year, 1806, I discovered it in the drain into the head of the cove, which I immediately ditched, and from the ditch put out seven hundred loads, on the fallow ground. The effect, as to the wheat and clover, was the same, (this was put, for experiment, at the rate of from forty to a hundred and twenty cart-loads per acre,) though the marl was not of the same kind as the other, but more mixed with sand and surface soil, being taken from the low ground, by ditching, and all mixed together. I also tried it on corn ground, spread out as above mentioned, and found the effect immediate, as to the corn; and in the same manner as above described, as to the wheat sown on the corn ground. This induced me to persevere in the use of it, which I have done ever since, adopting the mode I mentioned before, and putting it at first from forty to seventy loads per acre, till I have now come down as low as eighteen or twenty loads per acre, going the third time over the ground with it.

"I believe I have now answered all your inquiries, as well as I can, except as to the average comparison of the past and present crops, which I cannot well do, for the reasons above given, and also that my fields are entirely changed, neither containing the same grounds, nor the same quantity of ground in each; but I believe I shall not be much out of the way, if I say, that I think the soil now capable of producing between two and three times as much, per acre, as it would before I began to use the marl; and though the marl has not solely produced the improvement, yet the improvement would have been far short of what it is, if it had not been for the marl, which has contributed, in a very large degree, towards it; and no small matter in favor of the marl is, that, by the blessing of God on my endeavors, I have, in twelve years, been enabled to improve three hundred acres of ground, to the pitch that these are, and am now in a fair way of increasing in the same ratio that a snow-ball increases as it is turned over.

"I fear you will not be able to read, and hardly to understand, this tedious letter, in many parts; but I can, and it is in any degree satisfactory to you, I shall be compensated, and will cheerfully answer any inquiries, in future, that you may wish to make. The first favorable opportunity, which may probably be

some friend, in the spring, I propose sending you a small bag of marl, which may be more satisfactory than any description.

JOHN SINGLETON.

Talbot County, Md. Dec. 31, 1817.

[NOTE H. Page 49.]

GYPSEOUS EARTH OF JAMES RIVER, AND THE GREEN MARL OF NEW JERSEY, BOTH BELONGING TO THE "GREEN SAND FORMATION."

The passage in the text describing generally the gypseous earth of Prince George county, is left as it stood in the first edition, though much more full developments have since appeared. The first piece on the subject, to which the reader is referred, commences at page 207 Vol. I. of Farmers' Register. It is a full and minute account of the beds in my neighborhood of what I have called *gypseous earth*, and the reasons stated at length for believing it to be the same earth known in New Jersey under the name of *marl*. At that time I had never met with a specimen of the latter substance, and only inferred its qualities and its chemical constitution (in certain respects) from the loose and general, and very unsatisfactory statements previously published respecting that earth. Other subsequent notices in the Farmers' Register, at pp. 272, 572,) present additional facts or reasons in support of the identity of these formations. Afterwards Professor William B. Rogers discovered what geologists call *green sand*, intermingled with many of the bodies of marl near Williamsburg, and in an interesting communication to the Farmers' Register, page 129, Vol. II. in which this discovery is announced, he shows what the green sand is, and that it constitutes the valuable portion of what has been erroneously called marl in New Jersey. Mr. R. had not then seen my earlier account of gypseous earth—but reasoning upon geological grounds he inferred that the true green sand formation would probably be found higher up the country. He has since visited and examined the bed of what I had called gypseous earth, at Coggin's Point, Tarbay, and Evergreen, (in Prince George county,) and has found it to be the green sand formation, as was anticipated, and at the same time, confirmed my opinion of the identity of this earth with the New Jersey "marl." The green sand however in Virginia, so far as yet exposed to examination, is not to compare in richness with the best of New Jersey. The very little as yet known of the practical use, or measure of the value of this earth as manure, is in the paper first referred to above. The length of that piece and of Mr. Rogers', and their having been already published in the Farmers' Register, forbid their being again presented in this place: and in addition, it is expected that Mr. Rogers' more recent examinations will enable him to lay before the public a more correct and full account, which will of course be more interesting than the early views taken when the existing facts were but partially known—and so far as my own investigations went, were known to one who had nothing of the geological knowledge necessary to make proper use of the facts observed.

[NOTE I. Page 50.]

THE CAUSE OF THE INEFFECTUACY OF GYPSUM AS A MANURE ON ACID SOILS.

I do not pretend to explain the mode of operation by which gypsum produces its almost magic benefits: it would be equally hopeless and ridiculous for one having so little knowledge of the successful practice, to attempt an explanation, in which so many good chemists, and agriculturists both scientific and practical, have completely failed. There is no operation of nature heretofore less understood, or of which the cause, or agent, seems so totally disproportioned to the effect, as the enormous increase of vegetable growth from a very small quantity of gypsum, in circumstances favorable to its action. All other known manures, whatever may be the nature of their action, require to be applied in quantities very far exceeding any bulk of crop expected from their use. But one bushel of gypsum, spread over an acre of land fit for its action, may add more than twenty times its own weight to a single crop of clover.

However wonderful and inscrutable the fertilizing power of this manure may be, and admitting its cause as yet to be hidden, and entirely beyond our reach—still it is possible to show reasons why gypsum cannot act on many situations, where all experience has proved it to be worthless. If this only can be satisfactorily explained, it will remove much of the uncertainty as to the effects to be expected: and the farmer may thence learn on what soils he may hope for benefit from this manure—on what it will certainly be thrown away—and by what means the circumstances adverse to its action may be removed, and its efficacy thereby secured. This is the explanation that I shall attempt.

If the vegetable acid, which I suppose to exist in what I have called acid soils, is not the oxalic, (which is the particular acid in sorrel,) at least every vegetable acid, being composed of different proportions of the same elements, may easily change to any other, and all to the oxalic acid. This, of all bodies known by chemists, has the strongest attraction for lime, and will take it from any other acid which was before combined with it—and for that purpose, the oxalic acid will let go any other earth or metal, which it had before held in combination. Let us then observe what would be the effect of the known chemical action of these substances, on their meeting in soils. If oxalic acid was produced in any soil, its immediate effect would be to unite with its proper proportion of lime, if enough was in the soil in any combination whatever. If the lime was in such small quantity as to leave an excess of oxalic acid, that excess would seize on the other substances in the soil, in the order of their mutual attractive force; and one or more of such substances are always present, as magnesia, or more certainly, iron and alumina. The soil then would not only contain some proportion of the *oxalate of lime*, but also the oxalate of either one or more of the other substances named. Let us suppose gypsum to be applied to this soil. This substance, (sulphate of lime) is composed of sulphuric acid and lime. It is applied in a finely pulverized state, and in quantities from half a bushel to two bushels the acre—generally not more than one bushel. As soon as the earth is

made wet enough for any chemical decomposition to take place, the oxalic acid must let go its *base* of iron, or alumina, and seize upon and combine with the lime that formed an ingredient of the gypsum. The sulphuric acid left free, will combine with the iron, or the alumina of the soil, forming copperas in the one case, and alum in the other. *The gypsum no longer exists*—and surely no more satisfactory reason can be given why no effect from it should follow. The decomposition of the gypsum has served to form two or perhaps three other substances. One of them, oxalate of lime, I suppose to be highly valuable as manure: but the very small quantity that could be formed out of one or even two bushels of gypsum, could have no more visible effect on a whole acre, than that small quantity of calcareous earth, or farm-yard manure. The other substance certainly formed, copperas, is known to be a poison to soil and to plants—and alum, of which the formation would be doubtful, I believe is also hurtful. In such small quantities, however, the poison would be as little perceptible as the manure—and no apparent effect whatever could follow such an application of gypsum to an acid soil. So small a proportion of oxalic acid, or any oxalate other than of lime, would suffice to decompose and destroy the gypsum, that it would not amount to one part in twenty thousand of the soil.

Why gypsum sometimes acts as a manure on acid soils, when applied in large quantities for the space, is equally well explained by the same theory. If a handful, or even a spoonful of gypsum is put on a space of six inches square, it would so much exceed in proportion all the oxalic acid that could speedily come in contact with it, that all would not be decomposed—and the part that continued to be gypsum, would show its peculiar powers perhaps long enough to improve one crop. But as tillage scattered these little collections more equally over the whole space—or even as repeated soaking rains allowed the extension of the attractive powers—applications like these would also be destroyed, after a very short-lived and limited action.

Soils that are naturally calcareous, cannot contain oxalic acid combined with any other base than lime. Hence, gypsum applied there, continues to be gypsum—and exerts its great fertilizing power as in the counties of Loudoun and Frederick. But even on these most suitable soils, this manure is said not to be certain and uniform in its effects—and of course more certain results are not to be looked for with us. I have not undertaken to explain its occasional failures any more than its general success, on the lands where it is profitably used—but only why it cannot act at all, on lands of a different kind.

The same chemical action being supposed, explains why the power of profiting by gypsum should be awakened on acid soils after making them calcareous—and why that manure should seldom fail, when applied mixed with very large quantities of calcareous earth.

[NOTE K. Page 61.]

ESTIMATES OF THE COST OF LABOR APPLIED TO MARLING.

Before we can estimate with any truth the expense of improving land by marling, it is neces-

sary to fix the fair cost of every kind of labor necessary for the purpose, and for a length of time not less than one year. We very often hear *guesses* of how much a day's labor of a man, a horse, or a wagon and team, may be worth—and all are wide of the truth, because they are made on wrong premises, or no premises whatever. The only correct method is to reduce every kind of labor to its elements—and to fix the cost of every particular necessary to furnish it. This I shall attempt: and if my estimates are erroneous in any particular, others better informed may easily correct my calculation in that respect, and make the necessary allowance on the final amount. Thus, even my mistakes in the grounds of these estimates, will not prevent true and valuable results being derived from them.

The following estimates were made in 1828, according to the prices of that year. I shall make no alteration in any of the sums, because there is no considerable difference at this time, (January 1832,) and the least alteration would make it necessary to change the after calculations founded on them. But no one estimate will suit for years of different prices. If any one desires to know the value of labor when corn (for example) is higher or lower, he must ascertain the difference in that item, and add or deduct, so as to correct the error.

Cost of the labor of a negro man in 1828.

Hire for the year, payable at the end,	\$38 00
Food—19½ bushels of corn at 40 cents,	7 80
Add 10 per cent. for waste in keeping,	78
Meat and fish, &c.	9 00
	\$17 58
Interest for one year on \$17 58, paid for food,	1 05
	18 63
Clothing—6 yards coarse woollen cloth, at 50 cents,	3 00
12 yards cotton, for summer clothes and two shirts, at 12 cents,	1 44
Blanket at \$1 50, once in two years—yearly,	75
Shoes and mending,	2 50
	7 19
Taxes—State, 47 cents—county 47 —poor 33—road, suppose 1 dollar,	2 27
His share of expense of quarters, fuel, and sending to mill,	4 50
Nursing when sick, (exclusive of medical aid,)	1 50
	8 27
	\$72 09
Add 20 per cent. on the whole of the above for cost of superintendence, waste, wanton damage to stock, tools, &c., and thefts,	14 41
	\$86 50
Total expense per year,	
Time lost—Sundays and holidays, 58 days	
Bad weather and half-holidays, 20	
Sickness, 10	
From 365, deduct 88, leaves 277 working days	

which makes the cost of each working day 31½ cents.

Remarks.

The hire was fixed at the average price obtained that year for ten or twelve young men hired out at the highest bids, for field labor. According to our established custom, all the expenses of medical attendance, and loss of time from the death of a slave occurring when he is hired, are paid, or deducted from the hire by the owner—and therefore are omitted in this estimate. By supposing the slave to be hired by his employer, instead of being owned, the calculation is made more simple, and therefore more correct.

Cost of the labor of a negro woman.

Hire for the year,	\$10 00
Food,	12 95
Clothing, blanket, and shoes,	6 50
Taxes, quarters, fuel, mill, nursing, &c.,	7 19
Add 20 per cent. as before, for superintendence, &c.,	7 53
Total yearly cost,	\$44 67

Suppose lost time, 108 days, leaves working days 257, at 17½ cents for each.

Nearly all the women who are usually hired out, are wanted by persons having few or no other slaves, as cooks, or for some other employment at which they are more useful than at field labor—and their price is nearer fifteen dollars in these cases. But when there is no demand for such purposes, women for field labor will not bring more than ten dollars.

A boy of thirteen or fourteen would hire for more than the foregoing estimate of the hire of a woman, but would not lose half the time from sickness and bad weather, and therefore may be supposed to cost the same per day, or seventeen and one-third cents. A girl, fifteen or sixteen years, for similar reasons, may be put at the same price.

Cost of the labor of a horse.

First cost of a good work horse, \$80 00	
—supposed to last five years at work,	
makes the yearly wear,	\$16 00
Interest for one year on \$80 00—\$4 80	
—tax, 12 cents,	4 92
	\$20 92
20 bbls. of corn at \$2 00—3,500 lbs. of	
fodder at 50 cents the hundred,	\$57 50
Add 10 per cent. for waste in keeping,	5 75
	63 25
Interest on \$63 25, for one year,	\$3 79
Share of yearly expense for corn-house,	47
	4 26
Total yearly cost,	\$88 44

Lost time, 98 days, leaves 267 working days, at 33 cents.

A mule eats less corn than a horse, but more hay, and lives longer—and may be considered as costing one-fifth less—or yearly cost—\$70 00—and daily, 26½ cents.

A tumbril for marling, will cost when new, \$25 00

It will last two years, or (what is the same thing) if that sum will pay for all repairs, for two years—its wear per year, is \$12 50
Interest on \$25 00 for a year, 1 50

Cost per year, \$14 00

And at 267 working days—cost per day five cents.

In the estimate of the cost of horse labor, no charge is made for attendance, because that is part of the labor of the driver, and forms part of his expense. No charge is made for grazing, because enough corn and hay are allowed for every day in the year—and when grass is part of his food, more than as much in value is saved in his dry food. No charge is made for stable or litter, as the manure made is supposed to compensate those expenses.

It may be supposed that the prices fixed for corn, and fodder or hay, are too low for an average. Such is not my opinion. The price is fixed at the beginning of the year, when it is always comparatively low, because it is too soon for purchasers to keep shelled corn in bulk, and the market is glutted. Besides, the allowance for waste during the year's use (10 per cent.) makes the actual price equal to two dollars and twenty cents on July 1st. The nominal country price of corn in January, is almost always on credit—and small debts for corn are the latest and worst paid of all. The farmer who can consume any additional portion of his crop, in employing profitable labor, becomes his own best customer. The corn supposed to be used, by these estimates, is transferred on the first of January, without even the trouble of shelling or measuring, from A. B. corn-seller, to A. B. marler, and instantly paid for. Two dollars per barrel at that early time, and obtained with as little trouble from any purchaser, would be a better regular sale, than the average of prices and payments have afforded for the last eight years.

COST OF MARLING,

Founded on the foregoing estimates of the cost of labor.

From the beginning of November 1823, to the 31st of May 1824, a regular force, of two horses and suitable hands, was employed in marling on Coggin's Point, on every working day, unless prevented by bad weather, wet and soft roads, or some pressing labor of other kinds. The same two horses were used, without any change, and indeed, they had drawn the greater part of all the marl carried out on the farm, since 1818. The best of the two was seventeen years old—both of middle size, and both worse than any of my other horses, which were kept at ploughing.

The following estimates were made on a connected portion of this time and labor, and upon my own personal observation and notes of the work, from the beginning to the end. It was very desirable to me, to know the exact cost of some considerable job of marling, attended with certain known difficulties, and on any particular mode of estimating the expense: for although the same degree of difficulty, and of cost of labor, might never again be met with, still, any such estimate would furnish a tolerable rule, to apply, in a modified form, to any other undertaking of this kind.

These estimates may be even more useful to other persons—as they will serve generally to prove that the greatest obstacles to the execution of this improvement, are less alarming, and more easily overcome, than any inexperienced persons would suppose.

Both these jobs were attended with uncommon difficulties, in the unusual thickness of the superincumbent earth, compared to that of the fossil shells worth digging, and on account of the distance, and amount of ascent to the field. The first job was so much more expensive than was anticipated, that it may perhaps be considered as a failure—but as the account of its expense had been kept so carefully, it will be given, just as if more success and profit had been obtained. This work was commenced April 14th, 1824. The bed of marl for the upper six feet of its thickness, is dry and firm, though easy to dig, and rich. It has an average strength of $\frac{1}{10}$ —the shells mostly pulverized, and the remaining earth more of clay than sand. After being carried out, the heaps appear, to a superficial observer, to be a coarse loose sand. Below six feet, the marl became so poor as not to be worth carrying out, and was not used except when the distance was very short. Its strength was less than $\frac{2}{100}$. The bed at first was exposed on the surface, near the bottom of a steep hill-side—but as a large quantity had been taken out, and several successive cuts made into the face of the hill, some years before, the covering earth was increased, on the space now to be cleared, so as to vary between eight and sixteen feet, and I think averaged between eleven and twelve. The situation of the marl and road required that a clear cartway should be made as low as the intended digging: and therefore nearly all of the earth was to be moved by a scraper, and was thrown into the narrow bottom at the foot of the hill. This earth served thus to form an excellent causeway across the valley, which made part of the road in the next undertaking. All this marl runs horizontally, and the layers of different qualities are very uniform in their thickness. The greater part of the covering earth is a hard clay, or impure fuller's earth, which was difficult to dig, and still more so for the scraper to take up and remove. Part was thrown off by shovels, and served to increase a mound made by former operations, within the circle around which the scraper was drawn.

Labor used in digging and removing earth.

4 days' labor of 9 men, at 31½ cents each,	- \$11 25
6 women, } at 17½ cents,	- 5 58
2 boys, }	
1 young girl at 15, and 1 old man at 25,	- 1 60
8 oxen, (the scraper being drawn by 4 half the day, which then rested and grazed while the others worked the other half of the day,)—at 20 cents each,	- 4 80
Add 80 cents for wear of scraper, hoes, and shovels,	- 80
Total,	\$24 03

The price allowed for the oxen is much too high for the common work, and so much rest allowed: but they work so seldom at the scraper, that both

the men and the oxen are awkward, and the labor is very heavy, and even injurious to the team.

Labor of digging and carrying out the Marl.

Three tumbrils were kept at work on this job and the next, a good mule being added to the regular carting force—and no time was lost from April 20th, to May 31st, except when carts broke down, (which was very often, owing to careless driving, and worse carpentry,) or when bad weather compelled this labor to stop. One man dug the marl and assisted to load; another man loaded, and led the cart out of the pit, until he met another driver returning from the field, to whom he delivered the loaded cart and returned to the pit with the empty one. Of the two other drivers, one was a boy of sixteen, and the other twelve years old—the youngest only was permitted to ride back, when returning empty. The distance to the nearest part of the work (measured by the chain,) was nine hundred and two yards, and the farthest one thousand and forty-five: adding two-thirds of the difference to the nearest for the average distance, makes nine hundred and ninety-seven yards. The ascent from the pit, by a road formerly cut and well graduated, for marling, was supposed to be twenty-five feet in perpendicular height—and every trip of the carts, going and coming, crossed a valley, supposed to be fifteen feet deep, and both sides forming a hill-side of that elevation.

When only four and a half feet of the marl had been dug, a large mass of earth fell into the pit, covered entirely the remaining one and half feet of marl, and stopped all passage for carts. To clear away this obstruction would have cost more labor than the remaining marl was worth, and therefore this pit was abandoned. This happened on May 10th, when six hundred and ninety-nine loads had been carried out, and the work done was equal to thirty-six days' work of one cart (by adding together all the working time of each)—which was nineteen and a half loads for the average daily work of each cart, or fifty-eight for the three. The average size of the loads, by trial, was five and a half heaped bushels—and the weight, one hundred and one pounds the bushel. It was laid on at one hundred and four loads or five hundred and seventy-two bushels the acre.

Labor employed, for 699 loads, or 3680 bushels.

2 men at 31½ cents,	- - - 62½
2 boys at 19 cents,	- - - 38
2 horses at 33 cents,	- - - 66
1 mule at 26½ cents,	- - - 26½
3 carts at 5 cents—	
tools at 8 cents,	- - - 18
Daily expense, or for 58 loads,	\$2 11
Digging and carting 699 loads at the same rate,	\$25 25
Add the total expense of removing earth,	24 28
	\$49 05
Spreading at 31½ cents the 100 loads,	2 12
Total expense,	\$51 47

Which makes the cost per bushel, 1 34-100 cents
per load, (5½) 7 36-100
per acre, of
572 bushels, \$7 66.

This marl was laid on much too thick for common poor land, and one-fourth of the body uncovered was lost, by the falling in of the earth. If one-fourth of the expense of uncovering the marl, was deducted on account of this loss, it would reduce the whole expense nearly one-eighth.

As soon as the carts were stopped in the work just described, they were employed in moving earth from similar marl, across the ravine. The thickness, strength, and other qualities of the marl, on both sides, are not perceptibly different. A large quantity had also been formerly dug on this side, but the land being lower, the covering earth was not more than ten feet where thickest, and the average was eight and a half or nine feet. To make room for convenient working, and a large job, an unusual space was cleared, ten to fourteen feet wide, and perhaps fifty or more long. The shape of the adjoining old pits, compelled this to be irregular. The greater part of the earth was of the same hard fuller's earth mentioned as being on the other side—and the upper part of this was still worse, being in woods, and the digging obstructed by the roots and trees.

Labor used in digging and removing the earth.

6 men	4 days,	} at 31½ cents,	\$8 43½
1 man	3		
5 women	5	} at 17½ cents,	6 24
1 woman	1		
2 boys	5	} 25 cents,	50
1 old man	2		
2 girls	6	15 cents,	1 80
8 oxen, for the scraper, as before, each team at rest half the day, 5 days, at 20 cents,			8 00
3 horses and carts, 1½ days, at 38 cents			1 71
Add for damages to scraper and other utensils,			80

Total cost of moving earth, \$27 48½

Enough of the earth was carried by the carts to the dam crossing the ravine, to raise the roads as high as the bottom of the intended pit. The balance was thrown into the valley wherever most convenient. Only a small proportion, perhaps one-third, could be thrown off, without being carried away by the carts, and scraper.

The loads were carried to the same field, and by the same road as from the former digging. The first hundred and ninety-one loads served to finish the piece begun before, of which the average distance was nine hundred and ninety-seven yards: all the balance was carried to land adjoining the former, eight hundred and forty-seven measured yards from the pit.

The loads were ordered to be increased to six bushels, which was as much as the carts (without tail-boards) could hold, without waste, in ascending the hills: but as the loaders often fell below that quantity, I suppose the average to have been five and three-fourths heaped bushels, or five hundred and eighty-one pounds.

The tumbrils were kept constantly at this work, except when some of the land was too wet, or for some other unavoidable cause of delay. All the space which the old pits occupied, and over which the road passed, being composed of tough clay thrown from later openings, and which had never become solid, was made miry by every heavy rain, and caused more loss of time than would usually occur at that season. The same four laborers,

and two horses, and one mule, employed as before—and their daily work was as follows:—

May 13th,	Began the new pit			
13th,	2 carts all the day, and 1 for 2 hours only, (afterwards otherwise ployed,)	47 loads.		
14th,	2 " half the day, then employed otherwise—(1 horse idle)	21		
15th,	3 " " " " " "	61		
16th,	Sunday.			
17th,	3 " finished most distant work with " " " "	62	191	
18th,	3 " and began nearest with for 4 hours (stopped by heavy rain,)	4		
19th and 20,	3 carts at work elsewhere, on drier land,	22		
21st,	3 " again marling, - - -	75		
22d,	rain—no work done by horses.			
23d,	Sunday.			
24th,	1 " at other work.			
25th,	3 " again marling, - - -	74		
26th,	3 " " " " " "	75		
27th,	3 " " " " " "	72		
28th,	3 " " " " " "	72		
29th,	3 " (shafts of one broken and repaired,) - - -	64		
30th,	Sunday.			
31st,	3 " until rain at 4 P. M.	53	511	
			702	

average distance 997 yds.

average distance 847 yards.

After this stoppage, the horses were put to ploughing the corn, that the cultivation might be sufficiently advanced to use all the laborers in harvest, which began on the 11th of June. As near as I could determine by inspection, and a rough cubic measurement, about one-half of the uncovered marl was then dug and carried out. As the remainder was not dug until August, when I was absent from home, I have no more correct means of ascertaining these proportions; and shall according to this supposition charge half the actual cost of the whole uncovering of earth, to this supposed half of the marl which formed this last operation.

The list of days' work shows that the average number of loads per day, at eight hundred and forty-seven yards, was twenty-four and a half for each cart, which made twenty-three and a half miles for the day's journey of each horse. The first four days' work finished the farthest piece, of which the average distance was nine hundred and ninety-seven yards—but this part of the work was on the nearest side of that piece, and at less than that average distance. I shall not make any separate calculation for these hundred and ninety-one loads, but consider all as if carried only eight hundred and forty-seven yards.

The daily cost of the laboring force, 2 men, 2 boys, 2 horses, and 1 mule, was before estimated at \$2 11—which served to carry out 73½ loads, or 422 bushels. At that rate, (to May 31st,) 702 loads, or 4036 bushels,	
cost,	\$20 15
Add half the expense of uncovering, (half the marl still remaining not dug,)	13 74
For spreading, at 31½ cents per hundred loads,	2 18½

Total cost of 4036 bushels laid on, \$36 07½

Which makes the cost per bushel, 9 mills nearly.

And per acre, at 104 loads, or 598 bushels, \$5 84½
Or at 400 bushels, which would have been a
sufficient, and much safer dressing - \$3 57½

In 1828, at Shellbanks, a very poor, worn, and hilly farm, I commenced marling, and in about four months, finished one hundred and twenty and a half acres at rates between two hundred and thirty and two hundred and eighty bushels per acre. The time taken up in this work, was five days in January, and all February and March, with two carts at work—and from the 5th of August to the 27th of September, with a much stronger force. I kept a very minute journal of all these operations, showing the amount of labor employed, and of loads carried out during the whole time. It would be entirely unnecessary to state here any thing more than the general amounts of labor and its expense, after the two particular statements just submitted. At Shellbanks, the difficulties of opening pits were generally less—the average distance shorter, and the reduced state of the soil, and the strength of the marl, made heavy dressings dangerous. These circumstances all served to diminish the expense to the acre. The difficulties, however, at some of the pits, were very great, owing to the quantity of water continually running in, through the loose fragments of the shells—and almost every load was carried up some high hill. Taking every thing into consideration, I should suppose that the labor and cost of this large job of marling will be equal to, if not greater, than the average of all that may be undertaken, and judiciously executed, on farms having plenty of this means for improvement, at convenient distances.

Cost of marling 120½ acres at Shellbanks.

Preparatory work, including uncovering marl, cutting and repairing the necessary roads, and bringing corn for the team—Digging, carrying out, and spreading 6892 loads (4½ heaped bushels) of marl, - - - \$250 38
At the average rate of 57½ loads, or 259 bushels per acre, the average expense was, to the acre, - - - 2 08
To the load, - - - 3 cents and 63-100ths,
And to the bushel, - 0 83-100ths.

[NOTE M. Page 62.]

ESTIMATE OF THE EXPENSE OF WATER-BORNE MARL AND LIME, FOR MANURE.

The following extracts from different communications to the Farmers' Register present interesting and valuable facts, which show the actual cost incurred in procuring and applying water-borne marl, and comparisons of the cost, and of returns, of the use of marl and lime. To those who know the two gentlemen whose letters are here republished, it is superfluous to say that on none ought more reliance to be placed as farmers of good judgement. Both have had much experience of the use of oyster-shell lime as manure, and none value it more highly.

"To the Editor of the Farmers' Register.

Charles City, December 2d, 1833.

"I am sorry to have delayed sending you the estimate promised of the cost of applying oyster

shell lime as a manure: it was however unavoidable. I might have given it before this, on my own responsibility; but preferred to have others of as much experience to assist me in making it.

In the first place then, the cost of shells brought to our landing places, is per hogshead of eighteen bushels, 62½ cts.

To cost of getting them from the craft, if very convenient for landing,	2½
To cutting wood, allowing 12 cords for one hundred hogsheads,	3
To hauling shells to the wood, or wood to the shells, as may be most convenient, hauling out the shells after burning, slaking, scattering, &c.	32
	100

Thus making the sum of one dollar the hogshead. To afford then five hogsheads to the acre after burning, (which has been the quantity applied by myself and my brother, on very stiff land,) one third more must be added, as the loss by that process; and I am inclined to the opinion that a fraction more may be added, which will make seven hogsheads, the cost of which I have shown above to be seven dollars. On a lighter soil, four hogsheads are deemed sufficient, which will diminish the expense one dollar. If there is any error in this estimate, I am satisfied that it is in the low rate of charges: and I am confirmed in this opinion by one of my tenants, who is a man of considerable experience, having refused to accept the offer of thirty-five cents per hogshead, as full compensation for all the trouble and expense of liming, save the purchase and delivery of the shells.

Charles City Jan. 1, 1834.

"I am now enabled to complete the comparative estimate of the expense of lime and water-borne marl, for manure, which you requested me to furnish. If the statements submitted are not full in every respect, they may at least be relied on so far as they go.

"I commenced regularly to work about the 15th May to transport marl from Coggin's Point to my farm, a distance of fifteen miles by water, and ended on the 25th of December, a period of seven months. I had engaged in the business three hands, two of them at eight dollars per month, and the other a boy worth about two dollars and fifty cents. I purchased a craft, and when provided with all the necessary fixtures for commencing work, the cost was three hundred dollars. On the supposition, that this craft will at the end of ten years be entirely worthless, I will estimate the "wear and tear" or loss of capital therein, at thirty dollars per annum, the average annual repairs at thirty dollars more, and the expense of provisions for the hands at ninety dollars for the year. With these preliminaries, I think I may now fairly make out my account for the transportation of the marl, as follows:

To cost of vessel, in "wear and tear" for seven months,	\$17 50
To average expense of repairs,	17 50
To average interest on \$300, for seven months,	10 50
	45

Amount brought forward	45 50
Hire of three hands for seven months,	122 50
Provisions for seven months,	52 50
Paid for uncovering marl, and for putting on board a part of the whole quantity,	70 00
	290 50

CR.

By 15,000 bushels of marl, at $1\frac{1}{2}$ cents the bushel (very nearly,) 290 50

"This makes the whole cost of the marl, put out at my landing, less than two cents the heaped bushel. The estimate for hauling, scattering, &c. I will leave for you to add; that depends however on the distance; and I can only say, that a single horse cart was fully sufficient to keep way with the craft, a distance of one thousand yards. I think I can safely say, that no one can meet with more difficulties than I have myself encountered in this undertaking; my landing place being so bad, that I have known the hands frequently engaged for a whole week in unloading the craft, because of very low tides; when if the water had been sufficient to admit them to the wharf, they might easily have accomplished the work in half the time. I feel also perfectly justified in saying, that had I been so situated as to have the advantages of a landing place which no tide could interfere with, that five thousand bushels more of marl could have been brought during the seven months.

C. H. MINGE."

"The foregoing estimate may be implicitly relied on, so far as it rests on actual expenditures and operations—and in the items which are necessarily conjectural, we have every assurance of correctness, that can be furnished by the practical and business-like habits which characterize the writer. But as the estimate is not completely carried out, we will attempt to supply the deficiency, and will add some observations on the comparative expense of water-borne marl and lime.

According to the estimates of the cost of labor used for marling given in the *Essay on Calcareous Manures*,

A horse for a year's work, and including every expense, costs	\$88 44
Boy to drive,	44 67
Cart and tools,	14 00

\$147 11

"At which rate, the carting of 15,000 bushels of marl 1,000 yards, from the landing to the field, in seven months, cost \$85 81
Spreading the loads, in the field, at ten cents the 100 bushels. 11 50

\$97 31
Cost of transportation, &c. before stated, 290 50

Whole expense of applying 15,000 bushels, \$387 81

Or rather more than $2\frac{1}{2}$ cents the bushel.

"This estimate includes no charge for the marl, or none had been made. If half a cent was added

for this, it would increase the cost to about three cents the bushel. On the other hand, the price paid for hire was unusually high, as free hands only were employed, and only such as could be relied on. The difficulty of obtaining this marl was very considerable, on account of the great thickness of superincumbent earth to be removed. Many other causes of difficulty and loss were encountered by Mr. Minge (all serving to increase his estimate to what it exhibits,) on account of his having commenced a perfectly new business, to every part of which, he and his laborers were alike strangers. But without making any deduction for any of the peculiar difficulties which attended the operations, and supposing half a cent a bushel, a fair price to pay the owner of the marl, the entire cost will be counted at three cents the bushel. By the preceding estimate the entire cost of lime, at \$1 the hogshead of shells was $5\frac{1}{2}$, say $5\frac{1}{2}$ cents the bushel. Now we will compare values.

"Oyster shells are not pure carbonate of lime. They contain a portion (how much we know not) of animal matter, destructible by fire, and which is entirely lost in burning the shells. Whatever is this proportion of animal matter, it ought to be deducted from the weight and value of the shells; but not knowing this proportion, the shells will be here estimated as if they consisted of pure carbonate of lime. The marl, carefully averaged, and analyzed, was found to contain 61 per cent. of carbonate of lime.

"A peck measure of oyster shells, which had been well washed and dried, heaped about $1\frac{1}{2}$ inches, (supposed to be fully equal to selling measure,) weighed $16\frac{1}{2}$ pounds. The marl (an average of the whole thickness of the bed,) dried perfectly over the fire, and pounded, and pressed by the hands only in the same peck measure, weighed $20\frac{1}{2}$ pounds, even, and 24 pounds heaped. The measure and weight were supposed to be fixed by correct instruments—but the same were used, and at one time, so that the relative weights, at least, are correct.

One hundred bushels of oyster shells, weighing 67 lbs.=6,700 lbs. making of carbonate of lime the same,	lbs. 6,700
One hundred bushels of dried marl, weighing 96 lbs. = 9,600 lbs. and contain of carbonate of lime,	lbs. 5,856

Thus the marl which costs only a small fraction over one-half as much as the total expense of the shells, contains about 6 sevenths as much of pure calcareous matter.

"But one of these manures is applied mild, or in the form of carbonate of lime, and the other as caustic, or quicklime: and some may doubt whether an additional value is not gained by the burning of the latter. This, we leave to others to decide. In most cases, in this climate, we should consider the causticity of lime as more likely to be injurious than beneficial. The minutely divided state of quicklime, however, certainly enables every particle to come into immediate operation; whereas it might require two or three years before the full benefit of marl could be obtained. This somewhat slower action at first, is the only reason why marl should not be rated, according to its proportion of calcareous matter, full as high as lime.

"These results, which we have arrived at by

quite a different route, do not differ materially from those obtained by Wm. B. Harrison, Esq. (No 7, p. 396, Farm. Reg.) from his practice and experience. He applied burnt but unslaked shells, at the rate of seventy bushels, and marl at 140 bushels the acre; on adjoining and equal land, and found the crops of the first and second years equally increased by both manures, but that of the third year much better on the marled part. To make seventy bushels of burnt and unslaked shells, 108 would be required, (according to Mr. F. Lewis' estimate, Vol. I. p. 19, Farm. Reg.) so that according to the foregoing mode of calculation, Mr. Harrison's applications were at the rate of 108 bushels of oyster shells to the acre, and 140 of marl. His marl was from a bed of quality similar to that used by Mr. Minge, but was mixed with much worthless carth, and was transported at heavier expense.

"This comparative estimate of values, has been made to apply to a particular body of marl, because the actual labor was there employed, and it was desirable to estimate as much as possible by facts, rather than on conjecture. But there are doubtless many bodies of marl on tide-water, either richer, or more accessible, or perhaps possessing both those advantages in a higher degree."—*Ed. Farm. Reg.*

Charles City County, Feb. 4th, 1835.

"I have delayed much longer than I intended, in giving you an estimate of my last year's work in the transportation of marl. The pressure of business which is usual with me at the commencement of every year, must be my apology.

"Our work began on, or about, the 25th of March, and ended on the 24th December, a period of eight months. The labor employed was the same as the preceding year two men and a boy, with the exception of the first two months, when the assistance of the boy was unavoidably withdrawn. The wages of the men were eight dollars per month, and the boy's three dollars and fifty cents. The quantity of marl transported was seventeen thousand bushels. Our business was necessarily suspended for twenty days in repairing our frail bark, in the month of October. The distance is fifteen miles. I shall not attempt to give any estimate of the expense of hauling from my landing, and scattering the marl, as you have it already at hand, and can easily add it if you think it necessary.

To hire of laborers,	- - -	\$152 50
Food for laborers,	- - -	60
Repairs of vessel,	- - -	40
Interest on first cost and fixtures,	- - -	18

\$270 50

By 17000 bushels of marl } \$272 272
at 1 $\frac{6}{10}$ cents per bushel, }

1 50

"Thus showing that the expense of transportation alone falls under one cent and six-tenths per bushel. It seems to me wonderful, that so much preference should be given to oyster shells, by those convenient to water. I have used both, and greatly prefer the marl; first as being the cheapest—and secondly, as yielding a more immediate return for the labor, which is one of the most desirable objects to be attained in all improvement.

I am still laboring under great disadvantage in regard to the landing of the marl on my shore. Nearly one-third of each load requires to be shifted to a smaller vessel, to enable the larger one to reach the wharf with the remainder, which still convinces me that the digging and water carriage could be reduced, under more favorable circumstances, to one cent per bushel.

C. H. MINGE."

"According to the previous estimate of the cost of the preceding year's labor, the carting of these 17,000 bushels of marl from the landing to the field, (1000 yards) and spreading, would amount to \$110 28—to which add the cost above stated for digging and water carriage \$270 50, and it appears that the total cost was \$380 78, or not quite 2 $\frac{1}{4}$ cents the bushel. These facts well deserve the attention of all land-holders on navigable water, who have not marl on their own farms. The marl this year was brought from a different bed (in Surry) recently bought by Mr. Minge and others, to obtain marl for transportation, but at as great a distance as that which he worked in 1833."

—*Ed. Farm. Reg.*

*Upper Brandon, Prince George }
Co. Va., Nov. 1, 1833. }*

"The two following experiments to test the comparative value of lime and marl, were made on adjoining pieces of land of the same original quality, and previously manured from the same heap. The soil on which the first experiment was made, was a fine loam, rather stiff. I applied seventy bushels of unslacked lime per acre, and one hundred and forty of the marl, or two measures for one. The land was put in corn, succeeded by wheat, and is now in clover. The two former crops were equally and manifestly benefited by the calcareous matter, but the clover exhibits a much more flourishing appearance on the marled part, although it is very fine where the lime was applied.

"The land on which I tried the second experiment is now in corn. The soil is light. The quantities of lime and marl, and the previous improvement the same as before. The corn on the marled part is equally as good as where the lime was used, and strikingly better than on the adjoining land which had received the same dressing of putrescent manure.

"The marl used was brought by water 12 miles; and I applied only 140 bushels per acre, because the cost of this quantity, and of 70 bushels of unslacked lime, was found to be nearly the same, and from the tried efficacy of the lime, I well know, that, if the effect proved to be equally great, I could extend the use of it to great advantage. Contrary to my expectation, the results of the experiments stated, fully establish the fact that the 140 bushels of marl are at least as efficacious as half the quantity of lime. You ask how much the crop was increased by the marl? I regret that I did not ascertain by measurement, and cannot therefore say precisely—but it may be confidently affirmed, that the increase of the first crop of corn and wheat will repay the whole cost of the marling, and the land will be left permanently improved.

WM. B. HARRISON."

[NOTE N. Page 65.]

PROOFS OF THE EFFECT OF CALCAREOUS EARTH IN PREVENTING DISEASE.

"The perusal of the "Supplementary Chapter" to the Essay on Calcareous Manures, (in No. 2 of the Farmers' Register,) and the inquiry with which it closes, as to the effects of marl in purifying the air and contributing to healthfulness, induces me to mention a case somewhat in point. If I can give you no very satisfactory information, I may be the cause of eliciting it from others.

"The streets of Mobile are generally unpaved, and as a substitute for stone or gravel, which are not to be obtained, shells, (which have long been untenanted,) are strewn over the carriage ways and side walks to the depth of several inches. These soon become a firm mass, and form a smooth surface, so as to resemble a Macadamized road. The streets have a remarkably neat and clean appearance, and are much more pleasant than the paved ones.

"The shells, which are of various kinds, generally small, are raked up in great quantities in the shallow lakes, and brought to the city in large lighters.

"Mobile is much more healthy now than it was before this plan of improving its streets was adopted. It was proposed to "shell" some of the streets of New Orleans, but whether it was carried into effect, I am unable to inform you. The suggestion you have made may call the attention of its citizens to the subject. M." *Farmers' Register*, Vol. p. 152.

"In the 3d No. of the Register, a writer, under the signature of "M," has told us, that since the town of Mobile was paved with shells, it has become much more healthy. This is strong probable testimony in favor of the principles advanced. A few days ago, and before I saw the third No. of the Register, I saw a near connexion, who has just returned from a settlement which he has made on the Black Warrior, about 50 miles below Tuscaloosa. He spoke of the fact that Mobile had become much more healthy within a few years, without, however, assigning any cause. He also represented a very large portion of that country, between Tuscaloosa and Mobile, as calcareous, and abounding in shell marl, [or soft limestone.] He says, the country, if not more healthy, is certainly not more sickly than this part of Virginia,* and that it appears to be generally understood there, that the marl preserves it from disease. As one evidence of the fact, that the country owed its healthiness to the marl, he stated that the more northern parts of the state, where that deposit was not found, the country was more sickly."—*Farmers' Register*, Vol. I. p. 214.

"The fine rich prairie soil is calcareous manure itself, tempered by nature with the most happy combinations of silicious earth and vegetable mould: and the quality of the soil rises just in proportion to the justness of these combinations. In some places the calcareous formation approaches quite to the surface, and makes what are called "bald prairies." These sometimes cover as much as an acre, perhaps more, perfectly white and thick; but they are rendered productive by the addition of sand, and by ploughing—(being generally soft enough to yield to the plough—) and as soon as grass and weeds, or a crop of corn or cotton can take root, and leave a vegetable deposit, these bald plains grow black, or at least of a much darker shade. It is astonishing with what facility vegetable substances are decomposed in the prairies, and rendered subservient to the improvement of the soil. There is another fact connected with this part of the subject, that strongly

corroborates your views regarding the healthy action of calcareous earths on putrescent matter, contained in a "Supplementary Chapter," on that subject, in the second No. of the Farmers' Register. This fact is, that the prairies have proven to be the healthiest parts of the state—notwithstanding the water is to all appearance bad, and is unquestionably very unpleasant to the taste of those most used to it. The calcareous formation forms a substratum for the whole extent of the prairie country, and is accessible at the banks of every creek and gulley, and I have discovered it in various places at considerable distances from the prairies. In most instances it is white as chalk—sometimes it is blue—and in all cases it abounds with small sea shells almost decomposed. By cutting it with a saw and planing it, (as is often done for building purposes,) you see the lines, or sections, of the shells: by breaking it, you often see the impression of the surfaces of the shells. It grows harder by dry exposure, but it is not very good for building. It absorbs much water and scales by freezing. With sufficient heat, it turns to lime, which is good for building, but is too coarse and dark for plastering. The best lime is made from that which has been exposed perhaps for ages to the action of the sun and air; and that kind presents itself in various places, and in large tracts, exhibiting a very singular, craggy appearance, resembling large bones of animals, and other grotesque shapes."—*Farmers' Register*, Vol. I. p. 276.

Extract from the Southern Agriculturist of Aug. 1833.

"I have only seen the prairies of Alabama, in the counties of Montgomery and Lowndes, and have tried to ascertain the composition of the soil, and the effects produced on it by heat, drought, and moisture, so far as connected with their productions. The prairies mean the lime lands, and cover a large portion of the surface of the middle parts of that State, and are divided into the wooded and bald (or unwooded prairie) which are so interspersed, that in one thousand acres together of the most wooded, there will be from one-third to one-fifth of bald prairie, and in the most bald, a similar proportion of wooded prairie. To speak generally, the prairies are healthy, high, dry, and very undulating, presenting but few levels and no savannahs; the hills bald or unwooded, and covered with a dense growth of grass and weeds, furnishing coarse but excellent pasturage; the sides of the hills, beginning at about one-half of their declivities, with the intervening valleys (there called slues) wooded, with the soil of jet black color, which sometimes extends over the whole hill, though very often the bald parts are the color of lime; the crown of many of the hills to the space of half an acre, covered with the pure lime rock in lumps, which, on calcination, makes excellent lime, and in great abundance. The sides of the hills and slues are very properly considered the best lands as to fertility, durability and exemption from rust. The black soil, and that growth which shows rich land here, is considered the best, and the close or stiff soils, if such a term can properly be applied to lands so very loose, are to be preferred as being more certainly free from the rust, a disease to which cotton is very liable in the bald, and in some kinds of the wooded prairie, after long use.

"There are also some prairie swamps, or levels of considerable width, very rich indeed, and very closely covered with a dense growth of canes, (much of them more than thirty feet high) and a heavy growth of large timber. These lands, as well as some others, often present uniform inequalities over their general levels, resembling the hairs of large animals. The Indians say they are buffalo beds: they are called the hog-bed lands, and are considered the evidence of superior quality. But small portions of these lands have fallen under the stroke of the axe, from their difficulty of clearing, and being liable to be overflowed by the

* Nottoway county—part of the middle and hilly region of Virginia.

quantity of water which is precipitated on them from the very broken country about them.

"This embraces the general character of the surface of the country. The soil presents on and below its surface, oyster and other sea-shells, and the petrified remains of fish, and shows evidently that it was once covered by the ocean. It is for many feet in depth a mass of rotten limestone, in all the various situations in which it has been placed by the chemical action of heat and moisture, and by the decomposed vegetable matter. Those soils are best where there is the most vegetable matter: hence the woodlands that pay for their tenancy in the soil the annual contribution of their leaves, are better than the bald prairies which receive only a scanty contribution from their decayed grasses. The soil is a powder which dries quickly on its surface for an inch or two, and in dry weather is all over in small cracks, and looks very dry and husky and unfit for vegetation; but below its surface two inches, or below where the plough has reached, there is a perpetual moisture. The soil works up under the fingers without grit, and very much like putty. From a casual observation of the black light inland swamps of the lower country of this state, I would say, there was much resemblance between them as to appearance, but to appearance only. This quality in the soil causes the prairie to bear drought surprisingly, and good crops of cotton and corn are made on them, in seasons that cut short the product of other lands.

"This fineness of soil prevents the percolation of much water through it: hence, in the rains of winter, when but very little evaporation is going on, it makes the worst roads imaginable; so much so, that it is a material deduction from the value of any plantation, that should be more than ten miles from navigation.

"This fineness of soil, which prevents its absorption of water to any depth, I think the cause of another mischief. It prevents the gradual feeding of the wells and springs, and in dry summers they go dry to an extent on some few plantations, to require water to be hauled to the people in the fields, and in extraordinary years to be hauled to their settlements. It is very common for stock to suffer much for the want of water. So soon as the warmth of spring is felt, and evaporation begins, the roads improve surprisingly and become good, and the lands become dry; and when once well ploughed up in the spring, become as light as an ash-heap, or as lime itself, which it is, and no subsequent weather ever puts them out of order, except for a day or two, from some great rain. You can generally plough the day after a hard rain.

"The soil being so loose and light, makes it very liable to run its surface off with every rain, and I do not think that horizontal ploughing would save it, nor the means usually considered effectual here. I have tried cotton stalks, and bushes, up a slope without effect, that would have been sufficient here." You cannot ditch with the spade in the prairie: you would make as much and very similar progress in a barrel of pitch. With all this liability of your lands to wash, it will be a long time before you will lose its soil, for it is very deep. I find the opinion entertained by intelligent gentlemen, that the fertility may be restored by the chemical action of the sun and air without putting vegetable matter there. This looseness of soil and want of retention of moisture at the surface, during the crop season, makes the prairies the kindest and the easiest land to work. I would prefer to make a crop on them in an ordinarily good year, to preparing for one here.* You can very well cultivate one-fifth more land to the laborer, and gather two-thirds more of cotton. The reason why you can gather more, is, because the cotton pod in that soil and climate matures perfectly, and opens so wide, that the whole contents of the boll comes out at a touch of the fingers; when here, it is drawn out at two pulls, and sometimes a third; another

reason is, that you commence picking about a fortnight earlier than here, and this time in the long days of August, is equal to one bale, of our weights, to each laborer; and yet another reason is, that knowing that the amount of the crop depends on the gathering, all other works are so arranged as not to interfere with it.

"I think the country more healthy than this, owing in part to its being more high, dry, and broken, and more under the strong influence of the trade winds; but there must be a farther reason, because I have seen local causes enough to produce sickness here, in spite of the general causes of salubrity, that did not produce it there. Families reside with security on their prairie plantations all summer, in the midst of extensive clearings of rich land. I think it must come from some purification of atmosphere arising from the immense quantity of lime on and near the surface of the soil. The other lands in that country under similar circumstances, are not more healthy than here." The waters on the prairie do not corrupt; it is disagreeable to the taste, and both cathartic and diuretic in its effects on a new settler, but after a few weeks he becomes reconciled to its taste, and many prefer it to other good water."

Mobile, Aug. 28, 1833.

"Agreeably to my promise, I proceed to detail to you some particulars about the former situation and present condition of this place, in regard to its health, as connected with the system of shelling the streets, and in support of the position assumed in a *'Supplementary Chapter to the Essay on Calcareous Manures,'* recommending calcareous earths as promotive of health and cleanliness in cities and towns—(p. 76, Farmers' Register, No. 2.)

"I settled in Mobile in 1819, and have resided here ever since. Mobile is situated at the head of Mobile bay, just where the river of the same name enters it. The plain on which the city stands extends back five miles, and covered by a pine forest. The region of hilly pine woods then sets in, and affords fine healthy summer retreats. Summer retreats have been formed over the plain, quite from the city to the hill land; and they prove to be healthy. In 1819, Mobile was a small wooden built town—the streets narrow and deep with light sand, except under the bluff, (which was eight to twelve feet above the level of the river,) where the streets were muddy—the tide ebbing and flowing over a margin of marsh from 4 to 600 feet wide, the edge of the marsh next the bluff at all times wet springy land. The rapidly increasing trade of the place, early drew those engaged in it towards the river, and soon covered the flat with store-houses, built on lots so badly filled up, that water stood under all of them, without exception—under some 6 inches, some 1 to 2 feet; and encroachments were made quite into the water, by laying timbers horizontally, to give sufficient elevation. High tides brought in floating logs—marsh grass—and all small substances that were borne on the waves, depositing them in the streets and over the flat. There were only one or two streets at all filled in this flat, and they were very partially done. My first visit was in July, 1819, about the middle of the month: then it was healthy. About the last of that month, a violent S. E. storm cast an immense quantity of trash and filth over the flat, and a long drought followed, with prevailing north winds, which kept the water of the bay unusually low. The place that summer was visited with the yellow fever, to the extent of a pestilence. In 1820, there was no prevailing epidemic, though the place could not be said to be healthy; perhaps there were some cases of yellow fever. I was absent three or four months this year on business. In 1821, there was less sickness than the previous year. That year, the government sold the site of Fort Charlotte, (now New

* In South Carolina.

* In South Carolina.

the centre of the city,) and the citizens thus came in possession of an immense quantity of material for filling up. The fort was a very strong Spanish built one, with walls 20 to 25 feet high, and 15 to 18 feet thick, made of brick and stone, strongly cemented with mortar of shell lime. It had an outer wall, and a glacis surrounding the whole, of pure earth. All this, during the latter part of 1821, and in 1822 and 1823, was carted and spread over the flat, together with an immense quantity of earth taken from the back parts of the town, which went very far towards filling up the flats above high water. But this filling was put in the streets and lots, and the foundations of houses already built, were thus made lower than the surrounding land. In 1824, similar improvements were carried on, and up to (and including) that year, there was no epidemic diseases: but bilious fevers were common, and the place was counted unhealthy.

"In 1825, similar improvements went on, and the place was healthy up to the 25th of June, when a wet spell occurred that lasted through the most of July—showery, with intervening hot suns. That year, the old burying ground, which is now in the heart of the city, and internments in which had been discontinued the previous year, being the property of the Catholic Church, was laid off in building lots, and let out on long leases; and many who had friends and relatives buried there, were permitted to disinter them, and remove them to the new grave yard. This operation was carried on during the months of June and July, and the old graves were left open to the influence of the rain and hot sun, to evolve the noxious effluvia that had been engendered by the decomposition of the bodies they had contained. Most of the subjects that were removed were of those who had died in 1819 and subsequently; and I doubt not the miasmata that were exhaled partook of the nature of that which produced the disease of which the subject died—it may be it was identical. This year the yellow fever raged again like a pestilence, and, unless I have already assigned the real cause of the fatal sickness of this year, I am at a loss how to account for it from any local cause that would not have operated as powerfully any previous or subsequent year, anterior to the shelling system. It is to be admitted, that the deep loose sandy streets, and back yards, would serve as receptacles for an immense amount of animal and vegetable matter, thrown out from kitchens and shops, which, in a dry time, was trodden in and hid, and yet the substance remain to be operated on by heat and moisture: and that the effluvia thus created would co-operate with the cause before assigned. There is another collateral cause worthy of notice, that exposed many a poor creature to the influences of the general causes of sickness, and no doubt accelerated its progress. That year is remembered as the "gambling year." The legislature, by careless legislation, in a very laudable zeal to suppress that pernicious vice, by a sweeping clause so framed a law, as that it admitted a construction to license gambling, instead of suppressing it. Many gambling houses were opened under a \$1000 license, as public as taverns; and such scenes of dissipation have rarely been witnessed in any country. Exposure to night air, loss of sleep, loss of fortune, loss of character, drunkenness and debauchery, (all fruitful exciting causes,) no doubt had their full effect in swelling the list of mortality.

"In 1826 and 1827, many brick buildings were in progress, and the sites of them exposed by removal of the old wood buildings. This, with the general absence of cleanliness produced by the capacity of sandy streets to retain filth, as remarked above, caused sickness these two years. There were several cases of yellow fever in both years; but nothing to be compared with 1825. In October, 1827, a fire occurred that swept the whole business part of the town, and leaving left a house standing, wood or brick, in all the flats below the bluff. The legislature, at the next session, which commenced soon afterwards, passed a law

prohibiting the building of any other than fire-proof buildings within certain limits that included the business part of the town; and here begins a new era in the history of Mobile. In 1826, a brother of mine, who is a physician, then residing here, urged the importance of improving the health of the city, (which he deemed perfectly practicable,) both through the medium of the press, and in conversations, upon all suitable occasions. Nothing was done while he resided here; but his opinions took root, and were finally acted on. The shelling the streets was the prominent means, with various details regarding police and individual attention to cleanliness of yards, &c. Since 1827, the improvements in filling up, building, graduating, and shelling the streets, and paving the side-walks, have gone on so rapidly as to defy details; but the effect on the comfort and health of the place is abundantly obvious. In 1822, the first brick tenement was erected, and most of those that were afterwards built prior to 1827, were then burnt down. Now there are between 300 and 400. One entire new street in front has been made, having encroached on the river to the depth of six or eight feet of water: and from thence back to the bluff, the ground is well filled up—every street shelled—all the alleys—many of the yards—all the public warehouse yards, and the tavern yards, are shelled—several of the streets are shelled for half a mile back, and one that meets a leading road is shelled over a mile—many of the cross streets are shelled, and ere long, every street in the city will be shelled—it is, indeed, the settled policy, and without any constitutional bar to its exercise. Mobile has been uniformly healthy since 1827—and I have been particular in my details, that you might the better judge whether it resulted from the shelling system. You will, no doubt, give due weight to the circumstances of all the flat being well filled, and mostly covered with fine brick buildings. Last fall and this summer, while the cholera raged so fatally in New Orleans, Mobile was visited with very few cases, and they excited little or no alarm. In the first instance, nine or ten cases were reported: the deaths were four or five. In the last instance, no public reports were deemed necessary, and I cannot say, with any precision, how many cases occurred. I heard of some few deaths among the blacks—and the city continues perfectly healthy up to this time. The shells that are used are cockle, or sea mussel, as some call them. They are the size of a half dollar, to that of a dollar, of the form of a clam shell, and they are pretty thick and solid. They abound about the shores of the bay, and are contained in large banks upon the marsh islands opposite and above the city; perhaps having been the nuclei upon which those islands were formed. The shells are brought in large lighters, as your correspondent 'M.' informs you. [Farmers' Register Vol. I. No. 3, p. 152.] When the street is graduated after the manner of turnpiking, the shells are carted and spread over the street to the depth of four or five inches. The spreading hardly forms a moment's obstruction to the passage along the street: as soon as they are spread, which is done by scattering them with a spade, carriages and horses pass over them, and they very soon form a crust, so well cemented as to be difficult to dig up with a pickaxe. They wear out, by very constant use on the most frequented streets, but, by a little attention to breaks and thin places, when a street is once shelled, it is very easily kept in repair.

"I have been informed the shelling system has been attempted in New Orleans; but it will not answer for that place, owing to the ground being so much saturated with water as not to sustain the shells. I learn that it is difficult to make the deepest paving stand well, from that cause. If it will answer, I doubt not that New Orleans would find its account in covering every inch of its whole area. H."—*Farmers' Register Vol. I. No. 5, p. 277.*

DISCOVERY OF MAGNESIAN MARL IN THE GRANITE AND COAL REGION OF VIRGINIA

of the subject, and obtained very nearly the same proportions of these carbonates. From sixty grains of earth he obtained of

Carbonate of lime,	31 grains	} = per cent. {	51½	
Carb. of magnesia,	18			30
Silica,	3		} . . . {	16½
Alumina,	9			
Loss,	1			
	60		100	

The locality of this earth was as singular as its composition. According to the account furnished of its discovery, (by Dr. Meaux, in the Farmers' Register, Vol. I. p. 424,) Bear Island, where the bed was found, "lies between the first branches of Pamunky River in Hanover county," and "is situated on the first bed, and within a short distance of the first out cropping of granite, in ascending the Pamunky, and is pretty clearly in the same geological range that the Chesterfield and Henrico coal mines are, being in a northeasterly course from them, and showing thin strata of coal in a bluff of free-stone which overlooks Little River, a tributary of the Pamunky, and is the northern boundary of the [Bear Island] tract."

No late information has been received, showing whether any use has since been made of this earth as manure, or whether further discoveries of the extent of the bed have been made.

SHOWING THE NUMBER OF SPACES CONTAINED IN AN ACRE OF LAND, AT VARIOUS GIVEN DISTANCES.

The following table will be found useful for fixing the proper distances to place manure, lime, or other manures, so as to give any desired quantities to the acre. The last table though not relating strictly to the subject of manures, is convenient for fixing proper distances for planting, and other operations.

[illegible]

Table of planting distances.

Ft.	by	Ft. In.		Ft. In.	by	Ft. In.		Ft. In.	by	Ft. In.		Ft. In.	by	Ft. In.		Ft. In.	by	Ft. In.
9	by	9	537	5 6	by	3 9	2112	4 6	by	2 0	4940	3 3	by	3 3	4124			
do	"	8	605	do	"	3 6	2262	do	"	1 9	5531	do	"	3 0	4818			
do	"	7	691	do	"	3 3	2436	do	"	1 6	6453	do	"	2 9	4873			
do	"	6	806	do	"	3 0	2640	do	"	1 3	7744	do	"	2 6	5361			
do	"	5	968	do	"	2 9	2880	do	"	1 0	9680	do	"	2 3	5956			
8	"	8	680	do	"	2 6	3168	4 3	"	4 3	2411	do	"	2 0	6701			
do	"	7	777	do	"	2 3	3520	do	"	4 0	2562	do	"	1 9	7658			
do	"	6	905	do	"	2 0	3960	do	"	3 9	2733	do	"	1 6	8935			
do	"	5	1089	do	"	1 9	4525	do	"	3 6	2914	do	"	1 3	10722			
do	"	4	1361	do	"	1 6	5280	do	"	3 3	3153	do	"	1 0	13403			
do	"	3	1815	do	"	1 3	6336	do	"	3 0	3416	3	"	3 0	4640			
7	"	7 0	888	do	"	1 0	7920	do	"	2 9	3727	do	"	2 9	5289			
do	"	6 6	957	5	"	5 0	1742	do	"	2 6	4099	do	"	2 6	5808			
do	"	6 0	1037	do	"	4 9	1834	do	"	2 3	4555	do	"	2 3	6453			
do	"	5 6	1131	do	"	4 6	1936	do	"	2 0	5124	do	"	2 0	7260			
do	"	5 0	1244	do	"	4 3	2049	do	"	1 9	5856	do	"	1 9	8297			
do	"	4 6	1382	do	"	4 0	2178	do	"	1 6	6832	do	"	1 6	9680			
do	"	4 0	1555	do	"	3 9	2323	do	"	1 3	8199	do	"	1 3	11616			
do	"	3 6	1777	do	"	3 6	2489	do	"	1 0	10249	do	"	1 0	14620			
do	"	3 0	2074	do	"	3 3	2680	4	"	4 0	2722	2 9	"	2 9	5760			
do	"	2 6	2489	do	"	3 0	2904	do	"	3 9	2904	do	"	2 6	6336			
do	"	2 0	3111	do	"	2 9	3168	do	"	3 6	3111	do	"	2 3	7040			
do	"	1 6	4148	do	"	2 6	3484	do	"	3 3	3350	do	"	2 0	7920			
do	"	1 0	6222	do	"	2 3	3872	do	"	3 0	3630	do	"	1 9	9051			
6 6	"	6 6	1031	do	"	2 0	4356	do	"	2 9	3960	do	"	1 6	10560			
do	"	6 0	1116	do	"	1 9	4978	do	"	2 6	4356	do	"	1 3	12670			
do	"	5 6	1218	do	"	1 6	5808	do	"	2 3	4840	do	"	1 0	15840			
do	"	5 0	1340	do	"	1 3	6969	do	"	2 0	5445	2 6	"	2 6	6969			
do	"	4 6	1489	do	"	1 0	8712	do	"	1 9	6222	do	"	2 3	7740			
do	"	4 0	1675	4 9	"	4 9	1930	do	"	1 6	7260	do	"	2 0	8712			
do	"	3 6	1914	do	"	4 6	2037	do	"	1 3	8712	do	"	1 9	9956			
do	"	3 0	2233	do	"	4 3	2157	do	"	1 0	10890	do	"	1 6	11616			
do	"	2 6	2680	do	"	4 0	2292	3 9	"	3 9	3097	do	"	1 3	13939			
do	"	2 0	3350	do	"	3 9	2445	do	"	3 6	3318	do	"	1 0	17424			
do	"	1 6	4467	do	"	3 6	2620	do	"	3 3	3574	2 3	"	2 3	8604			
do	"	1 0	6701	do	"	3 3	2821	do	"	3 0	3872	do	"	2 0	9680			
6	"	6 0	1210	do	"	3 0	3056	do	"	2 9	4224	do	"	1 9	11062			
do	"	5 9	1262	do	"	2 9	3334	do	"	2 6	4646	do	"	1 6	12906			
do	"	5 6	1320	do	"	2 6	3668	do	"	2 3	5162	do	"	1 3	15488			
do	"	5 0	1452	do	"	2 3	4075	do	"	2 0	5808	do	"	1 0	19360			
do	"	4 6	1613	do	"	2 0	4585	do	"	1 9	6637	2	"	2 0	10690			
do	"	4 0	1815	do	"	1 9	5248	do	"	1 6	7744	do	"	1 9	12445			
do	"	3 6	2074	do	"	1 6	6113	do	"	1 3	9272	do	"	1 6	14520			
do	"	3 0	2420	do	"	1 3	7336	do	"	1 0	11616	do	"	1 3	17424			
do	"	2 6	2904	do	"	1 0	9170	3 6	"	3 6	3555	do	"	1 0	21780			
do	"	2 0	3630	4 6	"	4 6	2151	do	"	3 3	3829	1 9	"	1 9	14223			
do	"	1 6	4840	do	"	4 3	2277	do	"	3 0	4148	do	"	1 6	16594			
do	"	1 0	7260	do	"	4 0	2420	do	"	2 9	4525	do	"	1 3	19913			
5 6	"	5 6	1417	do	"	3 9	2581	do	"	2 6	4978	do	"	1 0	24454			
do	"	5 3	1508	do	"	3 6	2765	do	"	2 3	5531	1 6	"	1 6	19360			
do	"	5 0	1584	do	"	3 3	2978	do	"	2 0	6222	do	"	1 3	23232			
do	"	4 9	1667	do	"	3 0	3226	do	"	1 9	7111	do	"	1 0	29040			
do	"	4 6	1760	do	"	2 9	3520	do	"	1 6	8297	1 3	"	1 3	27878			
do	"	4 3	1863	do	"	2 6	3872	do	"	1 3	9956	do	"	1 0	34848			
do	"	4 0	1980	do	"	2 3	4302	do	"	1 0	12445	1	"	1 0	43560			

[NOTE S. Page 68.]

DISCOVERIES OF, AND OBSERVATIONS ON THE
"GYPSEOUS EARTH," OR GREEN SAND FOR-
MATION, OF VIRGINIA.

After the preceding sheet, which was intended to close this work, was in the press, and part of the impression finished, the continuation of Mr. Rogers' observations on the green sand of Virginia, was received for the Farmers' Register. It would be improper to omit this piece; and yet to insert it alone would not do justice to the views of its author, nor to the statements presented in the article on gypseous earth, to both of which the last communication makes frequent reference. On this account (though contrary to the previous intentions expressed in note H.) the first two pieces will be here republished, in the order they appeared, as a necessary introduction to the piece just received, and which will appear in the Farmers' Register, as well as here, to preserve the proper order and connexion of the subject entire in both publications.

From the Farmers' Register of Sept. 1833.

The gypseous earth of James River.

As far back as I can remember, crystals were sometimes found on the river shore at Evergreen, (two miles below City Point,) which attracted no farther notice than being admired for their perfect transparency. At that time it is probable that no one in the county had ever noticed crystalized gypsum, or even the lump gypsum of commerce, and no one had given the slightest attention to mineralogy. It is therefore not strange that the nature of these crystals was not suspected before 1817, when some person better acquainted with the subject, supposed them to be pure gypsum. The expression of this opinion attracted some notice at that time, but was received with general incredulity, founded upon the supposed impossibility of gypsum existing in this region, where it had never been heard of before. A lump was submitted to the inspection of a French apothecary in Petersburg, who had "chemist" painted on his sign: he at once pronounced that the substance was not gypsum, but *isinglass*.

The interest which I had felt with regard to this substance was soon after much increased by finding some small specimens on my own land, (Coggin's Point.) Having no prospect of having the question decided by any person possessing a scientific acquaintance with the subject, I consulted books, and found such instruction as enabled me to analyze the substance, and ascertain that it was pure sulphate of lime, or gypsum. But however satisfactory to myself, it must be confessed that my chemical proof was not much valued by others; because it was thought impossible that a process believed to be so mysterious, could be accurately performed by one who confessedly was ignorant of chemistry, and who had only resorted to its aid for this particular object. To settle all these doubts, I sent collections of choice specimens to two of the most distinguished chemists in the United States, with the request that they would give their testimony as to the nature of the substance. To have complied fully with my wish would not have required fifteen minutes of the valuable time of either of those gentlemen: yet neither paid the

slightest attention to the subject nor even returned my specimens. These were certainly the strongest among the very many proofs I have known of how little aid chemists are disposed to offer to agriculture. As these applications had been made to remove the doubts of others, and not mine, and to attract the public attention to what I considered an interesting and perhaps important subject, the results did not discourage the progress of my own investigations.

I had previously ascertained that the gypseous formation was of much greater extent and importance, than the crystals alone would indicate. In all the different places where the crystals had been found, they were imbedded in the same kind of earth, having a very peculiar appearance, and which extended along the south river bank, with but few interruptions, from Bayley's creek to Coggin's Point, a distance of eight or ten miles.—Having so marked a guide for examination as this earth presented, I found gypsum in it in various places, but in such small quantities, that alone it would never have attracted observation. It was evident that gypsum either was, or had been at some former time diffused through the whole body of this earth, and therefore I distinguish it by the general name of *gypseous earth*, although in most cases there may be no gypsum now remaining. This term of course is not always indicative of the present construction of the mass. The gypseous earth is of a dull greenish color, mottled with streaks of bright yellow clay. Where gypsum is visible, it is generally in numerous small crystals; sometimes in coarse white powder. At one spot only (where first discovered) are the crystals large. Here they are sometimes several pounds in weight, and of various and beautiful forms. Some are as transparent as glass; but generally, they are of a dark gray color, owing to a small quantity of dark earthy particles being enclosed between the *laminae* of the crystals. Except at this place, the solid crystals seldom exceed ten or twelve grains in weight, and generally are less than one grain. The most usual appearance in which they are presented in the bank, is that of a star, formed by numerous rays (each a solid crystal) shooting out from a common centre. As these rays are very slightly attached to each other, they generally fall asunder when removed.

In much the greater part of the gypseous earth which has been yet examined, no gypsum is visible; nor is it believed that even the smallest particle remains. But whether gypsum is present or not, the earth is filled with numerous hollow forms or impressions of shells, so as to prove that this was once part of a bank of fossil shells, (or marl as it is here called) of which the upper part, unchanged, still forms the cover of the gypseous earth, through its whole extent. The yellow clay, before spoken of, is very often presented in the form of shells, as if, when fluid, it had filled their vacant places. Masses of hard marl, coated over with crystalized gypsum, are also found here and there in gypseous earth. A close examination of the bed, and comparing the impressions of shells with the appearance of those still existing in the upper stratum, or in the neighborhood, will leave no doubt on the mind of the observer, of the change having taken place from a bed of fossil shells to gypseous earth.

This conclusion is attended with two difficul-

ties: In the first place, we are at a loss to know by what agency or means could so extensive, regular, and complete a chemical change have been made, as converting all the shelly matter (carbonate of lime) to gypsum, (sulphate of lime.) Secondly, admitting the means to exist, and the change to have taken place, it is still more difficult to guess what has become of the gypsum so formed—as not one-tenth of its proper quantity remains. When sulphuric acid takes the place of carbonic acid in combination with lime, the greater weight of the former, (together with the water chemically combined,) serves to increase the weight of the new compound about fifty per cent: or, in other words, one hundred grains of shells, or pure calcareous earth, if allowed to combine with sulphuric acid, will form at least one hundred and fifty grains of gypsum. So the mere change of acids being made, ought to give us an earth much richer in gypsum than it before was in calcareous matter. Instead of this, the gypsum is no where so plenty as we may suppose the shells formerly were; and by far the greater part of this bed now is entirely destitute of both gypsum and calcareous earth. What has become of it is beyond my power to explain.

The access of waters containing sulphuric acid, or sulphate of iron, would suffice to produce the change of carbonate to sulphate of lime—and the exposure to sufficient water, and for sufficient time, might dissolve and carry off the greater part of the gypsum. Sulphate of iron is perceptible on the surface of some of this earth near the head of tide water on Powell's creek, and was abundant enough to greatly injure the land on which some of that earth was applied thickly, for manure. *Sulphuret of iron* has also been found intermixed with the gypseous earth: and this mineral in contact with carbonate of lime, would also by chemical decomposition and new combination, form gypsum. It was at Berkley, in Charles City, that sulphuret of iron was found by Mr. Benjamin Harrison, near the bottom of a pit of thirty six feet depth, which he caused to be sunk in the beach and through gypseous earth. Many isolated masses of marl were reached, (such as I described above,) and Mr. H. thinks that the gypseous earth also was still calcareous. In either case, the chemical change from the carbonate to the sulphate of lime must be still going on, as the agent, sulphuret of iron, still remained in considerable quantity.

The discovery of the existence of gypsum caused the hope to be entertained at first that it would be found in large bodies, and pure enough to form a valuable commodity for sale, and distant transportation. But the examination which led to the foregoing conclusions, also served to dissipate these expectations. As the shelly bed which was the origin of the gypseous earth, was composed principally of worthless sand and clay, the new gypseous formation must have the same degree of adulteration, which would forbid its sale for transportation.

The only remaining use for the application of the new discovery, was as manure in the neighborhood where it was found: and circumstances then existing, and opinions almost universally entertained, prevented much profit being expected from this source, and discouraged even the experiments necessary to test fully the value of the

earth as manure. These circumstances and opinions will be stated.

When the wonderful effects of gypsum as manure in Pennsylvania, and in parts of the mountainous region of Virginia, were first made known, the reports excited as much of incredulity as astonishment, or of hope to reap the same rewards. But as a few pounds of pulverized gypsum were sufficient for the purpose, almost every farmer in lower Virginia, who was either enterprising or inquisitive, made some small applications for experiment. This was thirty five or forty years ago; and perhaps there was not one of these experiments recorded, or the precise result kept in remembrance. But as to the general result, there could be no mistake. The failure was so general, that every one of the experimenters agreed that gypsum was worthless in lower Virginia; and in that opinion all others concurred. Some marked instances of success presented on Berkley in Charles City, Curle's, Brandon, and some other fine soils on James River, when the use of gypsum was resumed fifteen or twenty years after, did not shake the opinion of the general unsuitability of our land for that manure. In this opinion I fully concurred—and of course could not expect to find our own impure gypseous earth more efficacious, than the purer substance from France or Nova Scotia.

But without expecting profit from the manure, the desire to prove its identity with gypsum caused me to make many small experiments with the pounded crystals, and with the earth in which they were found, in 1817, and afterwards. The results were not such as to promise profit from the extended use, but served to remove all remaining doubt as to the nature of the substance. On the several kinds of clover it sometimes produced remarkable benefit—but more generally, very little. On corn, it was totally inert, except in a very few cases, and in one of these exceptions, the benefit was remarkable. On other grain crops, no effect was ever found. These very different effects, instead of being imputed to the nature of the soil, and the crop, (as I have since ascertained to be the true causes,) were supposed to be evidences of the capricious manner in which this manure acted, and of its general worthlessness for this region. I saw indeed that its best effect was on calcareous soil—and even then began to entertain the opinion which since has been established by facts, that the want of calcareous ingredients in our soils, caused their unfitness to be improved by gypsum. I felt the less inducement however to continue my applications, because my own gypseous earth was poor, and limited in quantity: and I wished to reserve what there was of it for future use, when my land should be made calcareous, and more fit for clover. For these reasons, my use of the gypseous earth was almost abandoned for six or seven years, and no other person had then made any experiments to test its value as manure.

In the winter of 1825-6, I found on my land, a small body of gypseous earth containing at least one-tenth of pure gypsum on the average—and portions of it had as much as one-fourth. This caused me to resume its use. In 1826, 565 heaped bushels were applied, about 20 to the acre, (supposed to give from 2 to 3 of pure gypsum,) to various soils, and to different crops. In 1827, between 7 and 800 bushels were applied. The effect on clover, on land calcareous by nature, or made

so by art, was as great generally, as gypsum has ever produced elsewhere. On cotton, and on corn, the effects were irregular, and taken altogether, were not equal to the cost of the application. But though the use of this earth was now confirmed to land made calcareous, (as it was evidently worthless elsewhere,) I again lost the greater part of its value by another improper mode of application, which it may be useful to others to state more fully.

Judge Peters, to whom we are indebted for making known and establishing the value of gypsum, was of opinion that one of its operations is to hasten the rotting of vegetable matter when both are in contact; and thence he deduced the opinion of the propriety of mixing gypsum in heaps of compost, or of other coarse putrescent manure. Besides gaining this particular benefit from mixing the gypseous earth with my stable and farm yard manures, (which I was ready to believe on the high authority of Judge Peters,) I expected to derive from the practice a still greater benefit, in distributing easily and equally the earth over the land, which was very troublesome to spread alone. For these reasons, the greater part of my gypseous earth was spread over the litter in the farm yard and stable, in such quantities as was supposed would give about 20 bushels of the earth to every acre covered by the manure. The heaping of the manure to ferment, then cutting it down to load, and spreading it over the field, no doubt divided and distributed the gypseous earth very equally. It showed no effect on the succeeding crop, corn, (at least none that could be distinguished from that of the putrescent manure,) and none on the wheat, which followed. I had not expected much better results on these crops, but relied confidently that my clover, sown on the wheat, would show the effect of the gypseous earth equal to any on other land, where it had been applied alone. In this I was totally disappointed. Not the least effect of gypsum could be discovered on the clover—and thus the whole of this application was thrown away, as well as the greater part of the succeeding winter's application, which in like manner had been mixed with my other manure, and which had not then arrived at the time to prove its uselessness. The cause of this inefficiency is now plain enough. Fermenting manure, (and probably all fermenting vegetable matter,) forms *oxalic acid*, which attracts lime so powerfully as to take it from all other combinations in which it can be presented. This acid thus meeting with the sulphate of lime in the gypseous earth, at once decomposed it, and destroyed the peculiar manure before existing. No particle of gypsum remained to be carried out, and act on the land. It is useless here to extend my remarks on the operation of oxalic acid, as it has been done at length elsewhere;* it is sufficient to show by this statement that my obstinate adherence to this mode of application, for two winters, caused the loss of the greater part of gypseous earth, as well as the labor of applying it. The rich seam was by that time exhausted, and my later use has been with the poorer body, which, it is possible, may not be cheaper than to buy the imported gypsum. However, within the last year, my friend and neighbor Thomas Cocke of Tar-

bay, by applying earth apparently still poorer in gypsum, has produced such remarkable benefit on clover, that I am encouraged to return again to this kind of manure. The earth he uses is brown, and differs much from the general appearance as described above. We are both satisfied that the gypseous earth possesses some power to aid the growth of clover, independent of the pure gypsum contained. Last year, (1832) to test this opinion, I sowed French gypsum on clover at the different rates of 1, 2, 3 and 4 bushels to the acre on marked spaces. The benefit of the smallest application doubled the crop of clover—and it was increased by the heavier dressings, though not at all proportioned to the quantities applied. But the clover on the heaviest application (of 4 bushels,) was not to compare to the effect seen on neighboring and similar land, from 20 bushels of my best gypseous earth, and which was not greater than had often been found elsewhere. Mr. Cocke finds equal benefit, on clover made on poor light land, (that is, it is made as heavy as it can well stand,) from 40 bushels of his earth which appears so poor. It is necessary to observe that all these instances of benefit are on land made calcareous by fossil shells: and on my own, last spoken of, before that operation, the gypseous earth had been used, in heavy as well as light applications, and without the least effect. The very rich bed of gypseous earth at Evergreen has only just now been opened for use.

The statements made of my own practice show that I cannot boast of having derived much (if any) profit from the use of gypseous earth. Nevertheless, my experience may be more useful to others than it has been to myself, and the misapplications caused by my inexperience and ignorance may serve to show others, who have access to such manure, how to make proper use of it. Within the last year, circumstances have attracted attention, and been made public, which induce the belief that this formation of gypseous earth is much more extensive than was before supposed. The marl-beds in Hanover and Henrico, not far below the granite ridge, are covered by an upper bed of clay, which is very different in appearance from our gypseous earth, but agrees with it in being full of impressions of shells, and being destitute of any portion of the carbonate of lime, with which it was evidently so well furnished at some former time. No gypsum is visible. This earth also differs from that of Prince George in containing pure sulphur generally diffused throughout, as made evident by its strong sulphureous scent. I do not know that this singular and extensive formation is valuable as manure—but it is at least worth examination and trial. The clay bank through which Governor's street in Richmond is cut, is full of such impressions of shells, though it does not contain, and is not known even to cover, any remaining calcareous matter. If shells are below, as is probable, this is very near their termination in that direction.

In the bed of Howard's Creek, at the point where it flows nearest to the White Sulphur Spring, (within a few hundred yards distant,) there are many pebbles, varying greatly in form, appearance, and chemical composition, but agreeing in containing (like the earth before described) numerous hollow forms of small shells, of which nothing of the substance now remains, nor any

* Essay on Cal. Man. pp. 143, 224. [2d Ed. p. 92.]

trace of carbonate of lime. These stones are as solid and hard as those of similar external appearance usually are, which makes still more strange and unaccountable the entire disappearance of the shells which have at a former time been enclosed. I have mentioned this fact because it may possibly attract the attention of some of the men of science who visit that place, and induce them to observe and explain these singular facts. The silicious fixed rocks lying close by the Sulphur Spring also have many star-like impressions on their surfaces, (but not within, as in the other cases,) which from their similarity and regularity of form, must have been caused by small shells of one particular species. I found a similar impression on a pebble in the bed of the Calf Pasture River—and perhaps such facts may be numerous, and well known to others. In all these cases, there was not the least particle of carbonate of lime remaining in these stones, (as proved by chemical tests,) nor any appearance (to the eye) of any other salt of lime, to which the carbonate might have been changed.

The highland which lies over the whole extent of the gypseous formation in Prince George presents a surface and qualities of very peculiar appearance, and which may possibly have some connection with the gypseous bed below. If so, my description may direct more successfully the search for gypseous earth elsewhere. The land from Bayley's Creek to Coggins' Point, except where interrupted by some low alluvial tracts, seems as if it had been originally a high and level bluff, or abrupt termination of table land, which had sunk in successive slices, the lowest next the river, so as now to present somewhat the appearance of a hill side cut into terraces. Of course, this form is extremely irregular. The broken strata cause the greatest variety of surface: fossil shells fit for use as manure, barren clay, barren calcareous sand, and rich black soil, were all to be found in almost every acre, and remained distinct, until mixed by the cultivation of the surface. It does not rest on mere conjecture that this land took its present form and depression by sinking or *slipping*, as a similar natural operation to considerable extent, has taken place on the Tarbay farm within a few years, the progress and consequence of which are still visible.

The rich gypseous bank, at Evergreen, is at a place where the river is encroaching on the land, and every storm, or very high tide, adds to the acres which have doubtless been already swept away. In this manner was formerly exposed the remains of the trunk of a tree, lying even with the beach, and which when wet, presented the same spongy and soft texture on the surface, smooth and even yielding to the touch, as is usually seen in rotten and water-soaked logs. But except the surface, where water had probably dissolved the substance, every pore and cell of the log was filled with gypsum, though the form and grain of wood remained distinct. This complete filling of the cells could only have taken place when the gypsum was in a fluid state. The circumstance of a tree being found beneath a bank of shells, or what had been shells, might seem to be a proof that the shells were the later deposit of the two. But it is easier to believe that the whole body of earth, (though perhaps 50 feet high) was formerly thrown into its present place,

by one of those land-slips which have been already spoken of.

There is a kind of earth in New Jersey which was called *marl*, (as almost every earthy manure has been) but which seemed to me, from the imperfect descriptions given of it, to be the same kind of gypseous earth that I have described. Although this Jersey manure excited attention, and was bought, and tried, and reported on, by Judge Peters, there was no certain indication given to the public of the component parts of the earth, or what constituted its fertilizing power. Judge Peters speaks thus of it. "It is said by some that the *Jersey pyritous earth, called marl*, is of this description, [i. e. a mere stimulant;] and by others that it is permanently fertilizing. Nothing decisive can yet be pronounced, as its many varieties differ in their respective effects. There are facts both ways; so that this earth when applied, and the soil it is intended to assist, should be carefully scrutinized, and the qualities practically known. Some English chemists to whom it has been sent, style it an *hydrat of iron*; while others designate its composition, as a collection of decomposed *granite, schist, silex, alumine, iron*; in some specimens (no doubt those mixed with shells,) *lime* and *magnesia*, with *sulphur*. A more accurate knowledge of its parts and properties, is still required; and it is to be wished that our own chemists will give us their assistance. *Broom grass* and other pests on worn lands, may be destroyed by a top dressing of this earth and chloritic sands of a similar, though not so potent a nature; which substitute a natural growth of white clover."* In a communication of later date, Judge Peters made the following incidental remarks. "Four years ago, I procured 40 tons of Jersey manure, and spread it as a top dressing on many parts of the Belmont farm, on sand, clay, loam, and in every variety of exposure, as well as on moist and dry grounds. But in no instance any profitable effect appeared. A broad strip of the lawn, light and sandy, had been top dressed, and showed no signs of melioration heretofore. This strip is part of my little oat field; and it has [this year] thrown up a most luxuriant growth, far exceeding any other part, (though the whole was good, having been well *limed* throughout,) and affords a proof that this manure agrees with and co-operates with lime. I never saw, in the richest soil, stronger, better headed, or more promising plants. It would have been incompatible with my objects, or I should have suffered it to ripen, for experiment of its product. Mr. Mark Reeve, who is very intelligent on this subject, (and to whom I sent a sample of the manure,) informed me that I had been imposed on by the person from whom I procured it; the article used by me being only the cover of the true kind. Its effect, luxuriant as it is, must have been more so, if the perfect manure had been used."† I have seen it stated elsewhere, (though I am not able now to refer to the authority) that the Jersey earth was particularly beneficial to clover, and that it was used in small quantities, compared with other manures.

This description of the Jersey earth, and the

* Notices for a Young Farmer—by Judge Peters.—Phil. Memoirs, vol. 4.

† Phil. Memoirs, vol. 4.

effects imputed to its use, agree very closely with those of our gypseous earth. But it also seems, that no one entertained a suspicion that its value was owing to its containing, or forming gypsum. I therefore infer that the earth there used was similar to the great body and poorest kind of ours, having not a particle of gypsum remaining. If so, the effects produced as manure, were probably owing to either *sulphate of iron*, or *sulphuret of iron* remaining in excess in the earth—which, when meeting with *lime* in the soil, formed gypsum—and if no lime was present, remained either (as the *sulphuret*,) an inert, or (as the *sulphate of iron*,) a poisonous ingredient of the soil. *Iron pyrites* (sulphuret of iron) have been used with much benefit as manure—though that effect would probably depend on whether the soil was calcareous or otherwise.

From the publication of the passages quoted above, and many others on the same manure that appeared about 1819, and soon after, it might be supposed that the attention and labors of chemists would have been drawn to this manure, and its composition and value clearly settled; and that practical farmers would have fully profited by this instruction. On the contrary, all notice of the manure soon ceased, and no information thereon has since been given to the public. It may therefore be inferred that the manure was used so ignorantly, as not to be found profitable in general, and that even the solicitations of Judge Peters, and the influence of his venerable name, could not obtain this small aid from men of science, which might have shown when and why the manure was useful, or otherwise. If my views of its constitution are not mistaken, it is certain that this manure will be found useless on most poor soils, unless calcareous earth is used previously, or in conjunction.

EDMUND RUFFIN.

Shellbanks, Aug. 9, 1833.

On the discovery of green sand in the calcareous deposits of Eastern Virginia, and on the probable existence of this substance in extensive beds near the western limits of our ordinary marl.

William and Mary College, June 26, 1834.

To the Editor of the Farmers' Register.

Since my attention was drawn to the nature and properties of the New Jersey green sand, by the specimens which you sent me for analysis, and by our more recent conversations on the subject, I have made a visit to the region in which it is found, and have witnessed the most striking evidences of its utility as a manure. During this excursion, I examined the marl in all its varieties, and learned many interesting particulars respecting its use, from intelligent farmers, long experienced in applying it to the soil. I have moreover analyzed several specimens collected on the spot with the view, if possible, of throwing some light upon its agency when applied to the soil.

Since my return, I have made diligent search for this substance in our marl beds and the accompanying strata, and am at present directing my inquiries to that region of Lower Virginia in which, according to geological laws, as well as from some indications of which I have heard, this deposit

may reasonably be expected to occur. As far as relates to the marl beds of this vicinity, my search has been unexpectedly successful. With scarce a single exception, I have discovered particles of the green sand, mingled with the ordinary sand, clay, and shells; and in some instances, in so large a proportion as no doubt greatly to enhance the useful agency of the calcareous matter. Indeed, I am inclined to believe, that in some cases, the agricultural efficacy of the marl is chiefly owing to the green sand which it contains. In this conclusion I think I shall be sustained by facts hereafter to be noticed.

The general occurrence of this substance in our marl beds, is certainly a discovery of some interest; and though I may perhaps exaggerate its importance in a practical point of view, I cannot but think that it is worthy of the attention of our farmers. I speak of its general occurrence, because, although I have examined but few specimens from a distance, the general resemblance of our marl deposits throughout, together with the almost invariable presence of the green particles in such as I have inspected, would seem to justify the conclusion that it is a usual accompaniment of our marl formation, though by no means in equal proportions in all localities. Out of more than forty specimens which I have examined, there were only two in which the green particles could not be discovered; and as they frequently occur in patches, and not generally diffused throughout the bed, it is probable that even in the beds from which these two specimens were procured, the green sand might be elsewhere found. Some of the most efficient marls in the neighborhood of Williamsburg, contain a marked proportion of this substance. At Burwell's Mill, (three miles below the city towards Yorktown) the intermixture is so large, that the sand and *debris* of shells washed down by the spring freshet display a very distinct greenish olive tinge, which even travellers observe as they pass through the valley in which the deposit exists. At this place, the shells, as they are taken out of the extensive bank recently exposed by the torrent, are frequently filled with a dark mass containing as much as thirty per cent. of the green particles. In fact the whole bank is strongly tinged by them and the stratum which overlies the shells, in some places five feet in thickness, is precisely similar to some of the poorer deposits in New Jersey, and contains upwards of thirty per cent. of this substance. In Judge Semple's marl beds, in the same vicinity, the green particles are equally abundant—and, as in the former case, extend into the incumbent stratum of non-calcareous matter. In many instances, this layer of overlying earth has been found even more efficacious on the soil than the subjacent marl—a fact which might naturally be inferred, when the green particles abound chiefly in the upper stratum, from the extraordinary efficiency of the green sand as experienced in New Jersey. But by far the most interesting locality of this substance in point of extent, which I have examined, occurs on the shore of James River, adjacent to King's Mill and Littleton. Here the banks rise perpendicularly to the height of from forty to sixty feet, and for about three-fourths of this elevation are composed of shells and earth mingled with a large proportion of the green sand which in some places imparts a distinct color to the surface. The sand

of the beach is also filled with these particles which the rains have washed down, and which, at first view, present the appearance of the common black sand of our river, though in much larger quantity. At Bellefield, and other places on the York river, the banks and beach are similarly impregnated.

The green particles may be readily recognised by their want of lustre, the ease with which they may be bruised with the point of a penknife, and the bright green stain which they then produce. In examining earth or marl in which they are very sparsely scattered, the particles are sometimes difficult to separate from the other matter. My method is to moisten the end of the knife blade by applying it to the tongue, and then to remove several of the particles by adhesion. When placed upon a card and bruised, they leave a brilliant stain. This test may be confidently relied on.

The occurrence of the green sand so extensively through our marl region, affords strong grounds for hoping that valuable beds of this substance, like those of New Jersey, almost entirely unmingled with other matters, may be brought to light by a judicious and enterprising examination of the district on the western limits of our marl. And should such a discovery be made, the agriculture of Lower Virginia would become possessed of a new and powerful auxiliary in furthering its already rapid career of amelioration. Even the fact that the green sand often exists in considerable quantities in and above our ordinary marl beds, which is I think now sufficiently established, may furnish no unimportant aid in the improvement of our lands, by leading to a more varied and judicious adaptation in the application of our manures.

Independently of the existence of the green sand in a scattered state in our calcareous strata, there are other and stronger reasons for believing that a deposit similar to that in New Jersey will be found in the appropriate region. In a geological arrangement of our various formations, the marl beds of Eastern Virginia and Carolina, as well as those of Maryland, belong to a later period in the physical history of our country, than the green sand formation of New Jersey—the former being referred to the tertiary—and the latter to the secondary epoch of geologists. Now this tertiary deposit extends into New Jersey, and is found in many places in the latter state nearly contiguous to the green sand. Moreover, indications of the New Jersey formation have been found in Maryland—and such is the general regularity with which the different geological deposits are arranged, that we may fairly infer the existence in Eastern Virginia of the green sand, or some deposit equivalent in a geological point of view—though at the same time it by no means follows that the green sand, if actually found, would be sufficiently near the surface to render it extensively available as a manure. The object however is of such magnitude, as to justify a very diligent examination, and I am therefore desirous of enlisting in this research all those readers of the Register who reside in the region which has been alluded to before. As however the success of this investigation will be greatly promoted by acquaintance with the indications by which the green sand, or its geological equivalents are to be

recognised, and some knowledge of the properties and constitution of the substance itself, I shall here give a brief account of the New Jersey formation which I visited, together with the result of several chemical analyses of the sand carefully executed by myself and others: and further to interest your readers in this important inquiry, I shall add a statement of such facts bearing upon the application and agency of the marl, as I was enabled to collect during my visit to the beautiful region which it has so largely contributed to fertilize and adorn.

The New Jersey green sand is apparently identical with that series of deposits recognised in Europe by the name of the green sand formation, characterised by a predominance of minute green particles in many of its strata. In Europe these strata are generally found alternating with beds of chalk; but in this country no chalk is found, unless in the region west of the Mississippi. The fossils embedded in the green sand on both sides of the Atlantic, are however so strictly alike, that the geological equivalence of the American and European beds can scarcely admit of question, and is therefore generally conceded as an established point. It is relevant here to remark that in tracing cotemporaneous or equivalent geological formations in different regions, geologists are accustomed to rely almost exclusively upon the fossils, whether shells, bones, or vegetable remains, which the strata may contain—a procedure to which they have been led by the whole tenor of modern developments in geology. Now with reference to the New Jersey formation, though it would be impossible without numerous drawings, and much descriptive matter, uninteresting to general readers, to convey a knowledge of even the principal shells and other fossils existing in the green sand, some account of a few of these fossils may possibly be useful in the inquiries which I trust many of your readers will be prompted to undertake.

1st. *Lignite*, or carbonized wood, often associated with iron pyrites of a bright yellow lustre, frequently occurs in the beds overlying the green sand formation, though it sometimes occurs in other situations.

2nd. *Amber* is often found in a similar position, as was the case at the Delaware and Chesapeake Canal.

3rd. *Belemnites*—a fossil of a yellow or brown color, in shape somewhat like a cigar, but rather thicker—very brittle, and usually found broken transversely so as to exhibit its tubular character within.

4th. *Ammonites*—a fossil presenting the appearance of a snake coiled up in a flat coil, and frequently large and ponderous.

5th. The *Echinus*, or Sea Urchin—sometimes globular, at other times much flattened, having numerous little warty prominences, and minute perforations symmetrically arranged on its surface, and when entire, occasionally furnished with spines or prickles.

6th. *Gryphæa*—a shell having one valve very deep and convex, and the other flat. It somewhat resembles the small shell (*chama*) very abundantly found in our marl beds. This latter is smaller—has a rougher exterior, and has two muscular impressions in each valve—whereas the *Gryphæa* has but one.

7th. *Exogyra*—a shell like the former, with one

convex and one flat valve—but a great deal rougher and more irregular in aspect, and of large dimensions.

8th. The *Falcated Oyster*—a beautiful shell about one and a half or two inches in length, and bent like a Turkish scimitar.

These rude descriptions, which have no pretensions to scientific accuracy, are designed to draw attention to such fossils as may be brought to light in the region in which the green sand may be expected to occur—and in this point of view may prove of real value in examining for that deposit. Of course a scientific inspection of the fossils would be necessary to establish their identity, but this can readily be procured by transmitting them to the Academy of Sciences in Philadelphia, or by sending them to William and Mary, where they would be carefully examined and compared with the New Jersey fossils as collected and described. Indeed there is reason to believe that some of the characteristic fossils have already been found in Eastern Virginia. A bed of Lignite has been lately discovered on the Rappahannock, a few miles below Fredericksburg, the very point at which it might be expected to appear, and from information recently received, I am disposed to believe that Belemnites may be found near the mouth of Potomac Creek. It has been said also that the Gryphæa has been found, but I have not heard in what vicinity. These facts should furnish an additional stimulus to inquiry, and literally no stone should be left unturned in pursuit of so important a discovery.

The New Jersey green sand is generally found in the valley and meadows, though occasionally it rises to some height in the surrounding hills. Its depth in many places is very great, and several strata occur, separated by layers of shells, or blue clay, or sand colored by iron. The general aspect of the green sand is that of a bank of moist bluish clay—though in some places the green tint is very perceptible. This however only occurs where the earth is dry. When thrown into heaps by the side of the pit, the mass falls into a coarse powder, in texture and color very closely resembling gunpowder, on which account it is very commonly known by the name of *gunpowder marl*. This mass consists in very large proportion of the pure green sand, having a slight admixture of clay, and in many places of minute fragments of shells. Occasionally, the bank presents a mass of the pure green sand itself—and again, in some places the shells predominate. In one of the beds in the vicinity of New Egypt, I discovered small spiculae of gypsum, or sulphate of lime: but this occurred at no other locality—and in this place the crystals were so minute and few in number as to require the use of a microscope to be seen distinctly. The moist marl when warmed in the hand exhales a strong phosphoric odor, a fact which I believe has not been hitherto remarked.

As already observed, the marl frequently contains shells both in an entire and broken condition. This however is by no means universal. In fact, the great majority of those beds in actual use contain either no calcareous matter, or a very minute proportion of it. This I ascertained by chemical examination. In the vicinity of Arney's Town, Crosewick's Creek, and Shrewsbury, as well as other places, much of the marl which the farmers spread over their land, contains no carbonate of

lime; while at New Egypt the calcareous and non-calcareous marls are both extensively employed. The same is true likewise, of the beds farther south at Mullica Hill. The green particles themselves have an invariable composition—and those of our Virginia marl beds are perfectly identical with those of the New Jersey deposit. Thirty grains of the green sand yielded by careful analysis—

Silica,	15.51 grs.
Protoxide of iron,	7.56 "
Potash,	3.10 "
Water,	3.00 "
Magnesia, a trace.	

These results agree very closely with the determination of Berthier of France, and Seybert of Philadelphia. The former operated upon the green sand of Europe, the latter upon that of New Jersey. It appears therefore that the predominant constituents are silica and oxide of iron. The potash, amounting to about ten per cent. is most probably the ingredient chiefly concerned in the agricultural agency of the marl, though in what way its connexion with the other ingredients is severed when the marl is spread upon the land, I am at a loss to conjecture.

Throughout all the district in which this deposit occurs, it is extensively employed in agriculture. In the neighborhood of Arney's Town, one of the points which I visited, it has been used as a manure for the last thirty years—but its general introduction is of more recent date. In the region in which the marl chiefly abounds, the soil is loamy, having in some places a large intermixture of tenacious clay. East of this tract, which is a narrow band nearly parallel to the Delaware River, the country assumes an appearance very similar to that of the sandy lands of Eastern Virginia, covered with a thick growth of pine, and comparatively unproductive. On both these varieties of soil the green sand is continually used with the most striking benefit. For the clay soils, the more sandy marls are of course preferred; and for the sandy soils, those which contain some clay along with the marl. The proportion in common use near Arney's Town, is from ten to twenty loads per acre. In other places five loads or even less is found to be sufficient. The action of the marl appears to be very permanent, as will be evinced by the following statement. In a large quadrangular field over which I walked, four successive applications of the marl had been made at intervals of four years—commencing about twenty years ago. The first dressing was applied to the north side—the second to the south—the third to the east, and the fourth to the west—while a small space in the centre, was left without any marl. All four sides were covered with a very heavy crop of clover, which was nearly, if not quite as luxuriant on the north as either of the other sides—while the space in the middle was almost bare. The action of the marl appears to be most powerfully felt by clover and grass—but it is very conspicuous also with small grain and corn. A very intelligent farmer told me that it more than tripled his clover and grass crop, and doubled his small grain. In general it is spread upon the clover every fourth year, and ploughed in for the next crop. That it is very efficient upon sandy soils is evinced by the following striking fact. Some years ago at Arney's

terprising farmer near New Egypt, purchased two hundred acres of the Pine Barren, which, by marling, he has converted into pasture sufficient for one hundred head of cattle. Such is the demand for the marl, even at a considerable distance, that it has become an article of great profit to the proprietors of the pits, and more than one individual was pointed out to me who had risen to wealth by the sale of marl.

From what has been stated it will at once be evident, that the discovery of extensive and accessible beds of this manure in Virginia would be a most important accession to the resources of the state, and that an active and diligent search ought forthwith to be commenced throughout all the region in which there is a probability that it exists. Every aid which it is in my power to give, will be cheerfully bestowed in furtherance of this inquiry: and as I feel the double interest of a scientific curiosity, and a sincere solicitude for the agricultural prosperity of our state, I shall gladly receive all fossils and other specimens which may be transmitted for inspection or analysis, giving them a prompt attention, and communicating in reply such hints as may promise to be most useful in this deeply interesting and important investigation.

WM. B. ROGERS.

Extract from editorial remarks.

Among the most valuable of these discoveries we believe will be found that of the *green sand*, announced in the communication of Professor Rogers in the first part of this number. We rejoice that this and other kindred subjects have been undertaken by an investigator having suitable scientific attainments, as well as zeal for the pursuit. This discovery is as yet but dawning, and the examinations of many persons guided by the directions given in Mr. Rogers' communication, may be usefully employed to aid him in the pursuit. These aids we earnestly hope will be afforded: and those who may offer them, will no doubt serve their own private interests, as well as that of the public, by such labors.

These latter remarks would have appeared better placed immediately after the piece to which they refer. But our silence then was caused by the expectation (which unavoidable circumstances have compelled him to disappoint) that the author would add the result of an examination of the stratum of "gypseous earth," which we have believed to be very similar to, if not identical with the *green sand* or *Jersey marl*. This examination will yet be made: and we feel confident that there, and still nearer the falls of the rivers, will be found in the greatest quantities the earth described as *green sand*.

From the Farmers' Register of May, 1835.*

Further observations on the green sand and calcareous marl of Virginia.

In a communication published in the 3rd No. of the Register, I announced the discovery of the *green sand*, or silicate of iron and potash, in the secondary tertiary marl in Lower Virginia. Geological considerations, taken in connexion with this

discovery, led to the inference that an older deposit, consisting in much larger proportions of a peculiar substance, would be found in a region more remote from the seaboard, and not far below the head of tide; and from the great agricultural value of this substance, as proved by the experience of the farmers in New Jersey, I was induced to point out its probable position, and to give such hints and directions with regard to its accompanying indications as might prove useful in any researches which might be undertaken by persons residing in the region in which it was supposed to exist. Since the publication of the paper referred to, as far as other engagements would permit, this important inquiry has been actively continued, not only in reference to the presumed deposit above mentioned, but also to the extensive calcareous formation of our lower counties.

Besides the practical importance of this investigation to the agriculture of a large district of the state, in a purely geological aspect, it was calculated to excite the highest interest. In the vast region of our tide-water country, at farthest, only two members of the *tertiary* group of formations had been hitherto discovered, and no decided indications of a *secondary* deposit likely to prove interesting to men of science, had been found. At the mouth of the Potomac, and at some other points, a deposit had been detected by Mr. Conrad of Philadelphia, which from the great predominance of shells of *existing* species, was regarded by him as belonging to the upper or *newer tertiary*. The same eminent conchologist by an examination of numerous fossils from York town, Suffolk, the James River, near Smithfield, and other localities, had clearly proved that this portion of the *tertiary* series was of greater antiquity than the former, and accordingly he has recently applied to it the title of *middle tertiary*—which, as some geologists in Europe divide the *tertiary* group into *four* periods, would include both the second and third of these subordinate formations. The *lower tertiary*, which Mr. Conrad had so successfully investigated in Alabama, had not as yet been brought to light within the limits of Virginia. Thus, therefore, these inquiries appeared fraught with the lively interest of scientific discovery, while at the same time they inspired the animating hope, that in some of their results, they might eventually be found conducive to the interests of an important district of the state.

From the great extent of the *middle tertiary* of Lower Virginia, it was to be expected that, notwithstanding the diligence and learning of those who had visited several of its interesting localities, with the view of studying its fossil contents, an extensive field of future discovery would be opened to the scientific explorer—and a great variety of new and peculiar fossils would be brought to light. To a certain extent this anticipation has been realized; and the occasional examinations which I have made in this vicinity, and at some remote points, have been rewarded by an extension of the list of fossils, and the discovery of a number of new and interesting species. To the readers of the Register, generally, the details of these observations would appear unimportant, if not useless, and must therefore be omitted. At the same time, I may be allowed to add, that such facts are frequently invested with a *practical interest*, by the aids which they furnish to other and more impor-

* This has received the author's corrections of some slight errors in the first impression, and others in his MS.

tant discoveries; and that, however little value, in the abstract, would attach to an enumeration and description of the shells, zoophytes, and other remains of our marl banks, they are absolutely essential in studying the physical history of this portion of the globe, and may prove of some assistance not only in guiding the researches of the farmer after marl, but in directing his choice of calcareous manure, when various deposits of this substance are offered for his selection. Of the latter point, several striking illustrations might be adduced—but I shall content myself, for the present, with the statement of a single fact. A small shell of rough exterior, and rather irregular form, a species of *chama*, is frequently found in very extensive beds in this vicinity and at other points, forming nearly the entire calcareous portion of the deposit. From its peculiar form and friable character, it is most generally in a condition to be eminently serviceable as a manure. As the strata both above and below are often of a very different texture, though perhaps nearly equal to it in regard to their calcareous contents, a choice is at once presented to the farmer, in which, he will be guided even more by the nature of the shell embedded, than by the comparative abundance of carbonate of lime. But so little attention has been paid to the characters of the fossils contained in our marl-banks, that even in places where the manure has been longest and most successfully in use, a less valuable stratum is sometimes selected in preference to one of superior fertilizing power. A more minute observation of such particulars, can scarcely be expected, in the absence of some popular guide, in the form of delineations and descriptions of the more prominent shells, exempted as much as possible from technical or merely scientific phraseology. Some such illustrations may hereafter be furnished in a cheap form in the progress of a geological examination of the eastern region of our state.

Since the publication of my former paper, a great number of additional observations have been made with regard to the green sand contained in our ordinary middle tertiary marl. Its uniform presence in this deposit, in a greater or less proportion, seems now to be sufficiently established. That it is generally present in insufficient quantity to enhance in any important degree the agricultural utility of the manure, it would be going much too far to assert; but that in many cases the proportion is such as cannot fail of producing highly beneficial effects upon vegetation, would seem to be demonstrated not only by the long experience of the farmers of New Jersey with the green sand itself, but by the observations of individuals amongst ourselves who have been in the habit of applying a calcareous marl in which this substance is peculiarly abundant. In the vicinity of Williamsburg, almost every variety of the common marl may be found; but that which has been observed to produce the most striking effects as a manure, has uniformly yielded to chemical examination a comparatively large proportion of the green sand. When therefore, it is in the power of the farmer to make the selection, such marl should be chosen, as, along with a large proportion of calcareous matter in a suitable state of subdivision, contains also as great an amount as possible of this auxiliary manure. The beds of *chama* already referred to, as abounding on some

estates in this vicinity, are peculiarly rich in this ingredient, and are hence, as well as from their friable texture, generally selected in preference to all others. In some of these deposits, as large a proportion as thirty, and in some specimens forty per cent., has been found; and in cases like this, if we are to trust to the experience of New Jersey, a very marked addition to the fertilizing power of the marl must be ascribed to the presence of this ingredient.

In alluding thus to the influence of the green sand as an auxiliary manure, the inquiry naturally arises, to which of its ingredients are its meliorating effects to be ascribed, or do they arise from the conjoint action of the potash and oxide of iron which it contains? To this inquiry, perhaps, it would be premature to attempt to respond. At all events, the rationale of its action cannot be given with that certainty, which in such matters, it is desirable to attain. As stated in the former communication, its components are protoxide of iron, potash and silice; the latter ingredient appearing to act, as it is known to do in many rocks, in the capacity of an acid. In virtue of the potash contained in the green sand, we would naturally infer an agency in neutralizing acids, similar to that of lime, or its carbonate—and the extent to which the manure possesses this property, must appear still further increased when we advert to the chemical nature of the protoxide of iron.

Iron, like most other metallic bodies, combines with oxygen in more than one proportion. These compounds, or *oxides* as they are termed, are two in number, and in accordance with the general rule adopted by chemists in designating this class of substances, that which contains the least proportion of oxygen, is called the protoxide—that containing the most, the peroxide. The rust of iron, and the red coloring matter of ochreous clays, and of bricks and tiles, are impure specimens of the peroxide of iron. The protoxide is never found in an uncombined condition; and such is the avidity with which it imbibes an additional quantity of oxygen, or unites with carbonic and other acids, that it undergoes a rapid change whenever disengaged. Hence, under favorable circumstances, a strong neutralizing action might be anticipated from this ingredient of the green sand. We may therefore, for the present, rest our explanation of the agency of this manure upon the alkaline properties of these two constituents, the potash and the protoxide of iron. But in suggesting this explanation, it must be freely confessed that, especially as relates to the action of the protoxide of iron, it must be looked upon as problematical, and requiring for the establishment of its truth, an experimental knowledge of the influence of this substance upon the growing vegetable, of which nothing has as yet been positively determined.

As already indicated, when these inquiries were entered upon, and at the time when my first communication appeared in the Register, the existence of a lower tertiary deposit in Virginia had not been ascertained. The industry of Mr. Conrad had brought to light a formation of this nature in Alabama, and had led to the probability that it existed at Fort Washington in Maryland. Moreover one or two of the fossils obtained from the editor of the Register encouraged the hope that it might be found in our own state. The observations of that gentleman respecting the prop-

seous earth of James River* had appeared some time before, and though nothing positive could be gained from them, in relation to the geological character of the deposit, to which he affixed that name, they threw out the important and sagacious suggestion, that this earth was the same with the green sand of New Jersey, or at least a substance of analogous character. We shall in the sequel, learn that though geologically the two formations belong to periods which are distinct, the gypseous earth contains a large proportion of that particular ingredient, (the green silicate of iron and potash,) of which the New Jersey deposit almost exclusively consists. We are therefore indebted to the editor of the Register, for the announcement of the important fact, that the green sand, or a substance analogous to it, existed in certain localities on the James River.

Following up the suggestions of geological analogy, alluded to in my first paper, and stimulated by the observations and statements of Mr. Ruffin, I have been enabled by personal inspection, and through the kindness of correspondents, to ascertain with certainty, the existence of a *lower tertiary* deposit, throughout an extensive district of Eastern Virginia, and moreover to determine what is far more important to the agriculture of this region, that the deposit in question comprises immense strata of green sand, perhaps nearly equal in value to that which is in use in New Jersey. The reader, however, is by no means to infer from the existence of the green sand so abundantly, both in this lower tertiary and in the New Jersey formation, that the two deposits belong to the same geological era. I have already stated that the New Jersey green sand, is a *secondary* deposit—and of course anterior to the formation here designated as *lower tertiary*. The shells and other fossils, entombed in the two deposits are strikingly different, and characteristic of difference of geological antiquity. As it is desirable that clear ideas should be entertained, in relation to the distinction here drawn, I would claim the indulgence of the reader, in presenting such explanations, and illustrations, as are calculated to throw light upon a subject in which, at least in some particulars, all are obviously interested.

The term *primary* having been adopted by geologists as designating that extensive class of rocks which from various indications, appeared in general to have originated *first*, and which are destitute of all traces of animal or vegetable existence—the title of *secondary*, was of course appropriated to a class, apparently of more recent origin, usually overlying the former, and in which, in many cases, an enormous accumulation of organic remains had been discovered. A minute examination of these remains, consisting of shells, the bones of animals, &c., disclosed the curious fact that they belonged to races of beings of which, at present, there are only very few living representatives. Subsequent observations, first systematically made by Cuvier and Brogniart in the vicinity of Paris, further demonstrated that overlying the secondary formation of that region, there existed an extensive series of deposits of great thickness, the fossil contents of which were, on the whole, very dissimilar from those of the former—not only *all the species*, but many of the most

remarkable animal and vegetable forms being distinct, while at the same time many of the species were observed to be identical with others now alive. The difference thus marked between the two series of deposits, uniformly prevailing wherever they were observed, led to the introduction of the term *tertiary*, to designate the upper and more recent. By scrutinizing in detail the tertiary series, it was soon discovered to consist of several distinct subordinate formations, characterized by peculiar fossils, and becoming more assimilated in their organic contents to the existing living world, in proportion as their position in the series approached nearer and nearer to the surface. The most recent systematic writer on geology, and one of the most learned and able geologists of the day, has distinguished four subordinate formations in the tertiary series—and has given to each a specific name, expressive of its relative period of deposition. Though unwilling to perplex the reader with the terms of science, I may perhaps be excused on this occasion for introducing the names here referred to, on the ground that they are likely to be met with frequently hereafter in geological descriptions of the tertiary deposits of this country—and as they are distinctive of *things* which are characteristically different, and which have received no other denominations so appropriate, they have a just claim to be received. The terms thus employed by Mr. Lyell, the distinguished geologist above alluded to, are—

1st. *Pliocene*, indicating a *majority* of the contained fossils to be *recent*, and divided into *newer* and *older* Pliocene. Under this head are comprised some of the shell deposits near the mouths of our rivers.

2nd. *Miocene*, indicating a *minority* of the contained fossils to be *recent*. To this formation belong most of our calcareous strata which have previously been referred to under the title of middle tertiary.

3rd. *Eocene*, signifying the *dawn*; indicating the presence of a few fossils analogous to living species, or in other words a dawning of that condition of the animated world which now prevails. Examples of this are furnished in the lower tertiary of Alabama, and the lower tertiary here alluded to as recently discovered in Virginia.

The nature of the materials in which the fossils of these different deposits are embedded is very various. Sometimes the formation is a soft sand or clay—sometimes a sandstone or limestone of comparative hardness. In some cases the deposition appears, from the nature of the fossils, to have been made beneath the ocean—sometimes at the bottom of an extensive lake. In the vicinity of Paris, there are three marine formations alternating with two of fresh water or lake origin; and from one of the latter, the celebrated gypsum or plaster of Paris is extensively quarried. In Virginia, no traces of a fresh water tertiary have as yet been discerned. The general direction of the deposit is horizontal, and the whole appears to have been formed at successive eras beneath the waters of the ocean.

From what has now been said, it will at once appear that strong features of resemblance are presented in the geology even of the more recent formations in this country and Europe. The most striking similarity exists between the secondary of New Jersey and that of many places in Europe—

*Article on "Gypseous Earth," page 105.

as far as fossil contents are concerned. But in Europe a great proportion of these fossils are embedded in chalk; whereas, in New Jersey, no chalk has been discovered, and its place is occupied by green sand, very similar to that, which, in the former localities, alternates with the layers of chalk.

The lower tertiary or eocene of Virginia is found in a band of variable, and as yet unascertained breadth, traversing the state nearly in a direction from north to south. It makes its appearance on both sides of the Potomac, in a line a little east of Fredericksburg. It then crosses the Rappahannock near Port Royal, the Pamunkey probably near Piping Tree, and the James River at Coggin's Point. With regard to its course further south, though its existence is probable, additional data are required.

In general character, this formation may be thus described. At the base of the cliff or bank, there usually exists a stratum of what at first sight appears to be a blue or black clay, but which, on further examination, is found to consist principally of particles of the silicate of iron and potash, which when dried, becomes of a lively green color. Mingled with this substance are portions of common clay and sand, and numerous minute shining scales of mica. Embedded in the mass, and usually in a very friable condition, numerous shells chiefly of small dimensions will be found. Sometimes however, the matter of the shell has entirely disappeared, leaving a distinct cast or impression in the earth, by which its specific character may often be ascertained. Immediately above this stratum is a heavy deposit of what Mr. Ruffin has described as gypseous earth.* Large masses of crystalized gypsum, and sometimes the most beautiful groups of perfect crystals of this substance, are disseminated throughout this layer. It was this portion of the formation which Mr. Ruffin conceived to be identical with the green sand of New Jersey. In color, this stratum varies from a greenish yellow to a brown. Besides a considerable proportion of green sand, it contains, in addition to the crystalized gypsum, a notable amount of this substance in a subdivided state, and seemingly occupying the place of the shells which were formerly present, and have been decomposed under the chemical agency of some substance which filtrated in solution through the mass. Incumbent upon this bed is a thin layer of very pure white clay, of a texture which would recommend it to various useful purposes. Overlying the clay in some places, is a stratum of shell marl in a very subdivided state, containing masses of casts and shells approaching to the hardness of rock. This is the uppermost layer of the eocene

or lower tertiary formation. Yet at some points a stratum of the ordinary middle tertiary marl rests almost immediately upon the former, and would not by an ordinary observer be recognized as distinct. At Tarbay, where this succession of strata was observed, a thin and scarcely distinct layer of small brownish red pebbles intervenes between these two layers of shells, seeming to mark a comparatively violent action of the waters in the interval of the two deposits. But an examination of the shells, in these two contiguous strata, affords abundant evidence of their belonging to distinct geological epochs. In the upper stratum the large scallops, the common oyster of our marl, and all the usual ingredients of our middle tertiary or miocene formation, may be recognised. In the lower bed few or none of them exist, but certain characteristic shells belonging to the eocene period are entombed. Similar fossils appear below, in the green sand beneath the gypseous earth; and here a great variety of beautiful specimens may be discerned. An enumeration of these fossils in this place would of course be attended neither with utility nor interest, and indeed, were it advisable in the present stage of the inquiry, it could not be made, on account of the necessity of comparing the specimens with shells from other localities in Europe and this country, in order to identify species, and to decide upon those which are new, or peculiar to our own formation. That many such exist, I have every reason to believe, and with future leisure it is hoped that they will be named according to the fashion of the day, and described in the appropriate place. It will however be of real value to the reader, in any inquiries which he may institute, in reference to this formation, to obtain some general idea of the characters of two or three of the more conspicuous and characteristic shells. The observer will perhaps be able to recognize the following:—

1st. The *cardita planicosta*. This shell is of various sizes, rarely however equalling that of the clam. In form it bears some resemblance to that shell; but on the convex side a number of flattened ridges run from the knobbed extremity near the hinge, spreading from each other and enlarging as they approach the margin. The hinge part of the shell is very thick. This shell, occurs abundantly in the eocene or lower tertiary of Europe, and also in that of Alabama.

2nd. *Ostrea sellaformis*, or saddle-shaped oyster. This shell is very peculiar, having, when full grown, such a lateral extension on each side as to present, when the hollow of the shell is turned down, a very distinct resemblance to a saddle with its two depending flaps. It is found abundantly in the eocene of Alabama.

3rd. *Fusus longaevis*, a small shell less than an inch in length, and resembling in general form those which are commonly called conch. It is however flattened down on one side as if it had been subjected to pressure. This shell occurs abundantly in the eocene of Europe—but I believe has not until now been discovered in the corresponding formation of this country.

These three fossils, which are all found in great numbers in such of the eocene localities in Virginia as I have examined, are sufficient to identify the formation wherever they may be discovered. But as already indicated, they are accompanied by a variety of other shells, a large pro-

* The term "gypseous earth," used in the article referred to above, was applied not to a part, (as here supposed,) but to the whole of that formation which Mr. Rogers has since shown to be of "green sand." But it was also stated, that by the general application of that term to the extensive beds which seemed to have had a common origin, (and formerly, the same chemical composition,) it was not intended to convey the opinion that all this earth contained sulphate of lime, either in crystals, or finely divided. On the contrary, that ingredient was said not to be present, in any perceptible quantity, in but very few parts of the great body of what was there called "gypseous earth."—See Farmers' Register, Vol. I. p. 208.—Ed.

portion of which, would appear to be peculiar to this particular region. It would seem that the eocene of Virginia though agreeing in most respects with that of Alabama, contains some fossils found also in the Paris eocene, and which are absent from that of Alabama.

In most of the specimens of marl from this region hitherto examined, besides a large amount of green sand, I have found a considerable proportion of gypsum, and in some of them as much as forty or fifty per cent. of carbonate of lime. Specimens received from Dr. Corbin Braxton, at the Piping Tree, were found to contain, along with much green sand, a great amount of the carbonate of lime, and some gypsum. Judging from its composition and texture, it must be looked upon as a very valuable manure. At Coggin's Point, the lower stratum before described, contains from sixty to seventy per cent. of the green sand, with a small proportion of carbonate of lime, and occasionally a little gypsum. The next deposit above, (the gypseous earth) abounds in gypsum, but contains less green sand than the former. Of this ingredient, however, it still possesses a very considerable proportion. In alluding to the powerful effects of the gypseous earth, in a trial which he made, the author of the *Essay on Calcareous Manures* describes them as much greater than could be accounted for by the proportion of gypsum present, and hence throws out the suggestion that some other fertilizing ingredient was contained in the earth. This additional effect must doubtless be ascribed to the presence of the green sand.

In prosecuting the geological survey of Maryland, Professor Ducatel has been enabled to ascertain the existence of a green sand deposit throughout an important district of that state. Of its existence on both sides of the Potomac I was already fully aware—and it affords me much satisfaction

to find that the suggestions based upon general geological considerations, which were presented in my former paper, have already been so actively and ably followed up by this enlightened and diligent observer. Of the identity of some of the green sand deposits described in his report, with that now ascertained to exist in the eocene of Virginia, I am as yet by no means convinced; but a minute geological examination, such as that already instituted in Maryland, and that which is looked to with some interest in Virginia, cannot fail to throw very useful light on this, as well as all the other important deposits in the tide-water region of the two states. Mutual benefit would arise from the co-operation of surveys, conducted at the same time in the two adjoining territories, and in this way the interests of the states, as well as those of science, would be most effectually and speedily promoted.

To the very meagre details, in relation to the green sand, presented in this communication, I may hope ere long to be enabled to add the results of extensive and minute personal observation in the interesting region in which the eocene formation has been detected. In the mean time, the progress of inquiry may be greatly furthered by the friendly aid of those who, from their residence in the region in question, will have it in their power readily to collect specimens of shells or earth, and to transmit them to me for inspection. I would therefore, earnestly solicit assistance of this kind, and in return, I will gladly communicate the results of any observations I may be thus enabled to make. To urge the importance of this, and other similar inquiries, would now no longer seem to be necessary—since a large portion of the intelligence and enterprise of our state appears prompt to recognise their value, and interested in furthering their active and successful prosecution.

WM. B. ROGERS.

ERRATA.

Page 4, in date of preface, for "1834" read "1832."

5, at the end of the advertisement to 2d ed. insert date, "April 1835."

19, col. 1, 14th line—for "forty-seven" read "fifty-seven."

81, col. 2, 1st line of the note—for "translation," read "transition."

In the marks of reference to Appendix

Page 49, col. 1, line 47, after "Appendix H." add "and S."

58, col. 1, line 48, erase reference to "Appendix K."

61, col. 2, line 18, for "Appendix L," read "K."

68, col. 2, line 60, for "Appendix P," read "Appendix E."

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